# INTERNAL MIGRATION, REDISTRIBUTIVE POLICIES AND INCOME DISTRIBUTION IN TURKEY: AN INTERTEMPORAL CGE ANALYSIS

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# ABSTRACT

INTERNAL MIGRATION, REDISTRIBUTIVE POLICIES AND INCOME DISTRIBUTION IN TURKEY: AN INTERTEMPORAL CGE ANALYSIS

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This thesis focuses on the effects of the public policies on the size distribution of income in Turkey. To this end, an intertemporal computable general equilibrium model with heterogeneous agents in a small open economy framework is constructed. This study serves several extensions to the literature with its algebraic structure and calibration process in which various micro-level data sets have been utilized extensively. The results reveal that, in line with the previous findings of the literature, increasing budget allocations to unilateral social transfer programs has no significant effects on the size distribution of income and has adverse effects on the labor market decisions of relatively poor laborers. On the contrary, subsidizing the cost of labor has positive impacts on labor supplies and the size distribution of income improves in favor of relatively poor households.

**Keywords:** Income Distribution, Redistributive Policies, Internal Migration, Intertemporal CGE

# ÖZ

TÜRKİYE'DE İÇ GÖÇ, YENİDEN DAĞITIM POLİTİKALARI VE GELİR DAĞILIMI: ZAMANLARARASI HGD ANALİZİ

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Bu tez, Türkiye'de kamu politikalarının bireysel gelir dağılımı üzerindeki etkilerini incelemektedir. Bu amaçla, farklılaştırılmış karar alıcı birimlerin bulunduğu zamanlararası bir küçük açık ekonomi hesaplanabilir genel denge modeli oluşturulmuştur. Bu çalışma, yalnız matematiksel yapısı ile değil ancak aynı zamanda kalibrasyon sürecince çeşitli mikro veri setlerinden geniş ölçüde yararlanarak yazına katkılar sunmaktadır. Sonuçlar, ilgili yazının daha önceki bulgularına paralel olarak, toplam karşılıksız sosyal transfer bütçesinin arttırılmasının gelir dağılımı üzerinde kayda değer bir etkisinin olmadığını ve görece fakir emekçi kesimlerin işgücü piyasası kararlarını bozduğunu ortaya koymaktadır. Buna karşılık emek maliyetinin sübvanse edilmesi, hanelerin emek arzı kararları üzerinde olumlu etkiler yaratırken gelir dağılımının görece fakir haneler lehine iyileşmesini sağlamaktadır.

**Anahtar Kelimeler:** Gelir Dağılımı, Yeniden Dağıtım Politikaları, İç Göç, Zamanlararası HGD

To

*the memory of*

*my first love,*

***Handan***.

*I feel deeply that*

*she is in heaven*

*watching over me...*

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# CHAPTER 1

# INTRODUCTION

Social policies including social security services, health-care services, social services and social assistance programs are major subjects of academic research for decades. Recently, economic transformation towards changing sectoral composition of gross domestic product in favor of services and the demographic transition towards aging population due to low fertility have led to the necessity to reform the welfare state practices in several countries.

Expanding services sector can create large numbers of new jobs, however both the wage rates of the new entrants and the growth rate of wages in this sector are low because the sectoral productivity growth is low relative to the industry (Esping-Andersen, 1999). Since the former social policy frameworks are established based upon the previous production relations, the practices of welfare states have been reformed. The main objective of new practices is to help active working population without encouraging exits from the labor market in order to achieve funds provided by the welfare state. Thus, labor market regulations (under the new term of flexicurity) have been at the core of the reform activities. The term flexicurity refers to flexibility for firms in hiring and firing, while it means employment / job security for individuals according to their skills. The effective flexicurity policies are not designed to discourage individuals from the labor market participation and allow the recipients to accumulate skills. Hence, eligibility conditions for unemployment benefits are obstructed and duration of being a recipient is restricted to achieve the former objective. For the latter objective, active labor market policies such as mandatory participation to vocational education activities, job search, in-job training, etc. are implemented.

Analyzing reform efforts in the European Union (EU), Aiginger (2002) concludes that if a

country wants to keep the welfare provisions, private costs and productivity have to evolve in a balanced manner and fiscal balance should hold. To achieve this, building the policy framework with a long-lasting perspective by targeting productivity growth that is matched with higher wages has to be the main objective. The major policy then, should be boosting education and research activities in new technologies. However, this process in the EU has been interrupted by the global financial crisis of 2008-9 that hit the global economy. Despite huge monetary easing policies of the major central banks that resulted in negative long-term interest rates, neither employment nor economic growth could be stimulated as desired.

In the EU, in addition to the repercussions of the global crisis, the austerity policies put in action in reaction to the EU debt crisis, especially in the Mediterranean countries have had remarkable effects. The framework of the reforms within the EU has been drawn by the German Chancellor A. Merkel; *"7% of the world's population producing 25% of the global output cannot sustain 50% of global social protection spending"*[1]. Thus, reductions in the social protection expenditures to improve public fiscal balances to avoid fiscal insolvency, and implementation of supply-side reforms in the labor market in accordance with the social policies have become commonalities among the member countries. But it is also argued that the fiscal austerity is a short-term policy framework and the welfare states have to find a way to cope with the new social risks such as exclusion, inequality, lack of opportunity etc. On the other hand, resistance to erosions in the social rights and politicians' fears to lose the elections would damp the speed of transformation (Begg et al., 2015).

It is clear that one of the major problems of the governments is to coordinate social assistance programs with the labor market regulations. As Esping-Andersen (1990) mentions, flexicurity approach has resulted in the fact that the labor market regulations and the social policies are mutually interdependent, which is not the case within the previous practices of the welfare states. If social assistance programs were designed in a unilateral and time limitless manner, they would have discouraging effects on the labor market participation decisions of the recipients. In this case, decreasing wage income of the poor households, which is the main source of income for them, has to be compensated by welfare payments. If change in the former is

[1] Begg et al. (2015, 4). However, the authors claim that the numbers given by the Chancellor are not so accurate. By using current exchange rates and prices, the EU produces 24% of the global output and its share in total social protection expenditures is 40%. By purchasing power parity approach, the latter figure drops to 20%.

greater than the latter, the income distribution worsens further. In this respect, a bulk of the literature reveal that the social assistance programs' effectiveness on alleviating poverty and improving income distribution are questionable.

In the Turkish case, reforming activities of social policies have started in the field of the social security at the end of the $21^{st}$ century and mainly included gradual increase of the retirement age. The health system reform, i.e. Health Transformation Program, also enacted in 2002 with several dimensions, such as expansion of the Green Card[2] program in favor of poor households, conditional cash transfer programs to ensure health services accessions of children under age six and pregnant women who live in poor households etc. In the case of social assistance, number and variety of the programs have been increased and total budget of such programs has been expanded. However, there are voids in changing the point of view of the government in the transfer policy, mainly from charity-based approach to universal rights-based approach. Such programs have been criticized for escalations of transfer payments before the elections, clientelistic and rich households-biased coverage (especially for pensions) etc. Several studies for Turkey reveal that these payments have played a corrective role in terms of income distribution and poverty alleviation, in spite of their small shares in total household income.

There are only a few studies focusing on the effects of these programs on the labor market decisions of the recipients. According to Şeker (2011), being a recipient of welfare payment deteriorates the job search behavior of unemployed individuals due to absence of time limit on being a recipient. Yakut (2015) conducts an OLS analysis by using Household Budget Surveys of 2002-2011 and states that there is a negative association between the amount of welfare receipts of households and the hours of work decision of male head of households for all income quintiles but the effect decelerates as income increases.

In line with all these discussions, this thesis aims to explore the effects of the government policies, especially social transfers, on the size distribution of income. To this end, it analyzes the effects of the government's unilateral-unconditional welfare payments to households on the labor market outcomes of the recipients and on aggregate income distribution. As trans-

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[2] This is the non-contributory health-care program that was also introduced in 1992 and was replaced by General Health Insurance on January 2012.

fer income receipts of households change, their disposable income and thus consumptions change which, in turn, in a general equilibrium setting, affects the output prices. Increasing private consumption demands induce production and thus the demands in the input markets and invokes prices of factors of production. Changes in volumes of consumption, production and factor incomes trigger changes in the government revenues and the revenues of the social security institution (SSI). In order to explore interdependent characteristics of the policy on the entire economy in a comprehensive and consistent manner, this thesis utilizes a dynamic general equilibrium approach.

In this respect, an intertemporal general equilibrium model of heterogeneous households and multiple firms with the government, the SSI, and the rest of the world in a small open economy framework is constructed. Utilizing representative household groups (RHG) assumption, seven RHGs are chosen to reflect household characteristics and the labor market heterogeneity in terms of types of workers. The set of households is basically divided into two sub-groups via the saving decision. On the production side, sectors are chosen to have similar production structure with the compositions of private consumption expenditures which are derived from Household Budget Surveys (HBS). Eleven sectors are divided into two sub-groups in order to represent sectoral investment decisions. The SSI collects premium (contribution) revenues from wage income (gross wage costs) of households (firms) and makes unilateral payments to households as a fixed fraction of gross domestic product (GDP). Deficits of the institution are covered by the government. The government, as a non-optimizer unit, collects taxes from several sources, such as income tax from wage incomes of households, corporate tax from sectoral profits, tariffs from imported commodities etc. Its expenditures are government consumption, transfers to households (fixed fraction of GDP), transfers to enterprises (assumed to be fixed in real terms), the SSI deficits, and interest payments over the existing foreign debt stock. Any discrepancy between the government revenues and expenditures is financed via foreign borrowing at the world interest rate.

The model economy is calibrated to the year 2011. In the calibration process, besides the national accounts, an updated version of an input-output table for sectoral variables and intersectoral flows, the summary results of Annual Industry and Service Statistics to obtain the investment by destination figures, the HBS to compile the household level parameters (such as the shares in population, total wage income, total asset/property income, total transfers from

the government etc.), and the Household Labor Force Survey to obtain sectoral distribution of employment and sectoral wage rates, are used extensively.

This dissertation, to our best knowledge, is the first attempt to analyze the income distribution phenomenon in the Turkish economy by using intertemporal open economy CGE framework with multi-household and multi-firm structure. In the literature, several analyses utilizing similar framework are also available but this thesis includes several extensions to such models. First, utilizing several micro-level data sets in order to reflect the heterogeneities among the agents is a very first attempt for the Turkish case. Secondly, model constructed for the quantitative analyses incorporates multiple households with heterogeneous structures in terms of saving decisions, compositions of households' disposable incomes, compositions of households' consumption baskets etc. Thirdly, even it is widely used in the dynamic stochastic general equilibrium models, to our best knowledge, this study is the very first to incorporate non-Ricardian households, who are assumed to be hand-to-mouth, into a CGE framework. Moreover, households of this subset are also differentiated in terms of sources of incomes and labor supply decisions. These heterogeneities allow the model to produce richer results in evaluating the policy changes. Fourthly, this household heterogeneity is also reflected in the labor market structure and labor market is divided into 52 strata. Form the point of view of firms, all types of workers are imperfect substitutes for one another, while from the point of view of households, all sectors are imperfect substitutes. Thus, firms (households) allocate their labor demand (supply) among different types of workers (sectors) to minimize (maximize) the cost of labor (wage income). Another notable characteristic of the model economy is the incorporation of an internal migration from rural to urban along with an endogenous labor supply decision of individuals. The literature on this issue assumes perfectly inelastic labor supply by relying on the findings of Heckman et al. (1998) which claims that intertemporal elasticity of labor supply is low. However, it is obvious that individuals may alter their labor supply decision if they are allowed to do so. To our best knowledge, this study is the first attempt to solve for an intertemporal CGE model in which households endogenously choose labor/leisure in the presence of internal migration flows.

The recent policy framework of welfare payments in Turkey is based on unilateral unconditional cash and in-kind payments for which there is no officially announced time limit, i.e. transfers are paid as long as individual/household can prove her/their necessity. However,

the government has been criticized due to budget allocations on social policies. Among the OECD member countries, in 2012, the average share of total social expenditures in GDP was 21.5% while it was 12.3% in Turkey. By taking into account such criticisms, the first policy experiment constructed in this thesis analyzes the effects of an increase in the share of government transfers in GDP by 20%. The aim of this simulation is to postulate the effects of changing budgetary figures of welfare transfers without altering the policy framework. The expected but undesired result of such a policy change is its disincentive effects on the labor supply behaviors of informal workers and unskilled formal wage earners. These results are consistent with the general findings of the literature and the conclusions of Şeker (2011) and Yakut (2015) for Turkey.

As a second experiment, the employment subsidy program designed and implemented in the aftermath of the global financial crisis of 2008-9 is evaluated. The program formed under the Law 5510 in November 2008 has proposed five percentage points reduction in sectoral social security contribution rates to stimulate total formal employment. The effects of these programs are evaluated by using a microeconometric approach by Balkan et al. (2016), and via a CGE analysis by Yeldan (2015). This dissertation, rather than treating all sectors homogeneously, assumes that the subsidy rates are endogenous and are functions of sectoral shares in total unskilled formal employment. The results reveal that migration inflows from the rural to the urban expand and the labor supplies of all households increase. The effect is the highest for the informal workers. The reason is that since all types of workers are assumed to be imperfect substitutes of one another, as wage rate in one stratum goes up, the other types of workers' labor demands increase.

Although the dissertation focuses on the income distribution, the model with differentiated households, firms and labor markets structures is amenable to analyze the other major research questions including what should be the fiscal policy of the government to break the middle income trap?, What are distributional effects of such a policy change? Who gains, who loses? Similarly, the structural transformation of the economy to improve the international competitiveness, to reduce the country's fragile structure against the external shocks, to improve the income distribution etc, are the topics that can be analyzed. In line with the recent discussions such as the one raised by Rodrik (2015), the framework constructed in this thesis can be used to answer questions such as what are the effects of globalization and trade

patterns on decreasing industrial employment in the developing countries, i.e. employment (premature) deindustrialization?.

The outline of dissertation is as follows. In the next chapter, Turkish welfare regime and its evolution in a historical perspective is provided. Here, the literature on the income distribution for the Turkish economy is also briefly summarized. Chapter 3 is devoted to explain the model economy in detail by providing the whole algebraic structure. In the Chapter 4, the calibration process of the model parameters is explained and construction process of the Social Accounting Matrix is provided. Appendix A provides the list of endogenous and exogenous variables, the details of literature on the income distribution via CGE analyses can be found in the Appendix B. Appendix C delivers supplementary information on the model economy and the calibration process. Appendix D provides aggregation keys used in input-output table to sectoral aggregation and in Household Budget Surveys to aggregate consumption expenditures. This dissertation analyzes the effects of two policy shocks. Chapter 5 explains the details of these experiments and discusses the results. For interested readers, sectoral and household level details of the base-path of the model is provided in the Appendix E. Chapter 6 concludes.

# CHAPTER 2

# TURKISH WELFARE REGIME

## 2.1 Introduction

The welfare regime is one of the major subjects of academic research for decades. Ongoing negative consequences of the global financial crisis of 2008-9 lead to a rise in the importance of the topic, not only for the developing / emerging economies but also for the developed countries. Despite the importance of the issue, there are no consensuses on the definitions of the key concepts. Welfare state, welfare regime, and social policy are used interchangeably in the literature but obviously they have different meanings. According to Esping-Andersen (1990), the narrow definition of the welfare state consists of income transfers, social services and, for some countries, public assistance on shelter. On the other hand, the broader definition deals with the political economy aspects of the issue. The government's role in the economy in terms of the labor market regulations and the effects of public policies on the overall economic environment are crucial. In that sense, welfare state defines a package of production and distribution of welfare. However, the term "welfare state" became insufficient to explain functioning of the state due to a mixed production of the welfare by public institutions and private provisions, especially after 1980s. This emerged the term "welfare regime" which can be defined as combined, interdependent way in which produced welfare is shared by state, market, and family (Esping-Andersen, 1999, 34-5).

Social policy, on the other hand, defines the set of publicly financed and managed policies to reduce the social risks. Existence of a social security system, coverage of the health system, coverage of social assistance programs and social services are sub-dimensions of social

policies. These policies aim to make people participants of the society as free individuals enjoying equal rights while charity and informal solidarity networks are beyond the scope of these policies (Buğra & Keyder, 2005b, 7).

The focus of this dissertation is analyzing the effects of redistributive policies by special emphasize on unilateral social assistance payments of the government on the income distribution in Turkey. However, the developments in the field of social policy practices in the last decade are not limited to changes in the social assistance programs in terms of total expenditures, the number and the coverages of the programs. Therefore, in line with this focus, the developments in the other fields of social policies will not be mentioned. Grütjen (2008) and Üçkardeşler (2015) supply a general assessment of the recent changes in the Turkish social policy framework. Fehr (2016) provides the most recent survey of social security reforms within CGE framework, and Değer (2011) provides a detailed analysis of the Turkish social security system before and after the reforms enacted in the last decade. Moreover, the author presents the effects of these reforms on the institutions' balance sheets and on the overall economic outlook in an OLG framework. The health system reforms also constitute another major aspect of changes in the social policy framework. Smith and Yip (2016) provides an assessment of health system design in an economic perspective. In the Turkish case, the general effects of the reforms can be found in World Bank (2014), while Hone et al. (2016) analyzes family medicine reform enacted in 2005 by assessing its effects on user satisfaction and service usage.

In the next sections of this chapter, the types of welfare regimes, their social policy frameworks, and relations with the labor market regulations are discussed. Then, the evolution of the welfare regime in Turkey is summarized in a historical perspective by providing the literature on the issue briefly. In this section, studies that focused on the income distribution are mentioned, while studies that deal with another major phenomenon, poverty, are excluded. For a recent works on the issue and brief summary of the literature, see Şeker and Dayıoğlu (2015) and Şeker and Jenkins (2015). Lastly, the current social policy framework is summarized by mentioning several programs and their eligibility conditions.

## 2.2 Evolution of Welfare States and Social Policies

Esping-Andersen (1990) defines three different welfare regimes, namely conservative, liberal and social-democratic. The classification is based on the social stratification, the quality (or de-commodification) of the social rights, and the relationship between the state, market and family. Conservative (Continental European) welfare state puts family into the center of the social policy framework and aims to keep the status differentials among classes / social statuses. In the labor market, wage is determined by collective bargaining and maintenance of (full) employment (if possible) is the major concern. The eligibility conditions of the welfare programs include the means-tested procedures to get the moderate amount of assistance. In a liberal welfare state, the stigmatized means-tested assistance with strict eligibility conditions, and the modest universal transfers are predominant[1]. Wage rates are determined by individual bargaining in the relatively unregulated labor markets. The state encourages individuals to participate in the private welfare provisions by backing them via tax credits and tax shelters schemes (Esping-Andersen, 1999; Aiginger et al., 2007). In the social-democratic (Scandinavian or Nordic) welfare states, the redistribution, the high level of social inclusion, and the universal rights are the main pillars. The regime aims to generate an equally distributed higher living standards regardless of the status of individuals. The regime plays a crucial role in the welfare production and its distribution to avoid the consequences of market or family failures. Active labor market policies, originated in Sweden, to overcome the unemployment problem via increasing labor mobility, are used. In order to prevent a decrease in the welfare of individuals due to family failures, the state provides children- and elderly-care services to encourage the participation of females into the labor force (Aiginger et al., 2007).

The establishments of the welfare policies started in the late $19^{th}$ century in Bismarck's Germany and followed by the United Kingdom in the beginning of 1900s. In the United States, these practices started after the Great Depression and formed around the *New Deal* idea of F. Roosevelt. Overcoming the devastating social and economic consequences of the World War II was the first challenge of the welfare states. Here, the reforms in the UK became one of the most influential progress in establishing the modern welfare policies. The report, *So-*

[1] The welfare stigma is "disutility arising from participation in a welfare program per se" (Moffitt, 1983, 1024).

*cial Insurance and Allied Services*, so-called the Beveridge Report[2] formed the framework of the reforms by proposing the government to establish a social insurance and a social security framework based on children's allowances, comprehensive health and rehabilitation services and maintenance of employment. The essential features of the Beveridge's proposals were minimization of the state's role and maximization of the responsibilities of individuals and poverty reduction rather than income replacement. It is also argued that even Beveridge's conservatism and inflexibility had been overstated, the plan led to vitally important reform of replacing the tax-based financed social security system with the contribution-based system (Bridgen, 2006). This resulted in an independence between the labor market regulations and the welfare policies, which can be formulated as "Keynes plus Beveridge" (Esping-Andersen, 1990, 147).

Until the mid-1970s, the welfare state practices were almost stable. However, the stagflation period in the aftermath of the oil crisis in 1970s, the trade liberalization in 1980s that was followed by the financial liberalization, and the acceleration of globalization process forced the welfare states to change their methods of operations. Esping-Andersen (1999) uses the term "postindustrialization" to define the structural change in which the sectoral composition of GDP has been shifted in favor of services. This de-industrialization process has three repercussions; a massive unemployment among less-skilled individuals, increasing labor participation of females makes the employment maintenance harder and, lastly, the shifts of employees across sectors get harder due to the power of the labor unions and the rigidities in the labor market regulations. According to Aiginger (2002), the costly welfare programs and the insufficient labor market flexibilities caused disappointing economic performance in the Europe during the 1990s. Thus, the core of the policy agenda, by following the success stories of the Netherlands, Denmark, Sweden, and Finland, was constituted by the labor market reforms which were targeted to give flexibility to firms in firing individuals and security to individuals in terms of the assistance to find a new job in accordance with their skills.

These two arguments emerged a new concept, "flexicurit", which describes the framework of

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[2] It was published in November 1942. The overall framework of the report is based on struggling against five "giant Evils" in the society; squalor, ignorance, want, idleness, and disease. Musgrove (2000) states that the report is one of the rare example of influential study on government policies since it still has impacts on current debates, studies and reforming proposals.

the labor market re-regulations. Although the name of the concept had been pioneered since the late 1990s, it was not a new policy framework. Andersen and Svarer (2007) states that hiring / firing flexibility and the generous unemployment benefits were the characteristics of the Danish case until the mid-1990s. However, due to high and persistent unemployment, the labor market reforms implemented by changing the unemployment benefits program (with more strict eligibility conditions and shortened duration) and the active labor market policies (embedding welfare-to-work elements into the social policies) has been enacted[3]. Welfare-to-work elements include mandatory participation of welfare recipients into an activity like job search, child-care, public services, on-job training etc. to trim them with several skills and to discourage participation to programs in exchange of nothing. Kaushal and Kaestner (2001) provides an evidence for the US that, between 1994-99, the share of population under the coverage of welfare payments program decreased from 5.5% to 2.3% due to mandatory participation in such activities. The Australian reform in the same manner reduces the welfare caseloads by one fourth and the number of recipients by half (Fok & McVicar, 2012). Lorentzen and Dahl (2005) emphasizes the importance of supporting welfare recipients to increase their self-sufficiency capacity and Woods et al. (2002) warns that accompanying reducing welfare payments by suitable programs has to be vital part of the reforms to prevent individuals from working informally to keep being welfare payment recipient. Neugart (2007) states that unemployment benefits (UB) and employment protection legislation (EPL) are the main two policy tools of the welfare states to protect individuals from the risk of unemployment. However, a trade off between these two options emerges since out-of-labor force voters prefer employment protection of a member of household whose existence secures the assistance receipts. On the other hand, they also want to receive lower amount of UB since it increases the total household income and, in turn, reduces the assistance receipts. Thus, the policy choice depends upon the size of those voters.

[3] The authors also claim that regulating the labor market with flexicurity without active labor market policies creates a malformed structure.

## 2.3 Evolution of Turkish Welfare System

The classification of Esping-Andersen (1990) is criticized in line with the fact that there are some other countries / systems that do not fit into these typologies. The reasons are differences in the labor market structures and the cultures, especially in terms of the importance of family, and the coverage of the social policies. Esping-Andersen (1999) defines the other forms of welfare regimes such as the Antipodean, the East Asian, and the Mediterranean[4]. The author expresses that the Mediterranean system could not be defined as a "regime" because it is just related with family-based social assistance programs which are designed for the political clientelism rather than the social protection (Esping-Andersen, 1999, 88-92). The countries that belong to the Mediterranean welfare regime, or the Southern Europe model as commonly used in the literature, share the following commonalities (Buğra & Keyder, 2003; Karamessini, 2007).

- **The role of Government:** Public employment opportunities are available for individuals who are selected for the sake of favoritism rather than by taking into account their qualifications. This affects efficiency of public institutions negatively.
- **The Labor Market Structure:** Since small family entrepreneurship lived longer due to the late industrialization, self-employment and unpaid family workers constitute the majority of total employment. Indeed, working in informal casual jobs is a common phenomenon. Employment of males, as a main bread-winner, is under the protection which makes women (gender inequality is high) and less-experienced individuals, especially youths, disadvantaged groups. The skill-based segmentation feeds wage inequalities, determines the working conditions and the rights of employees even in the formal jobs. In the informal jobs, the picture worsens.
- **The Social Security System:** It is based upon status differentials which also have repercussions on the coverage of the health insurances. Dependent members' social security are provided by the head of household's social security. The system has corporatist elements since the government supports the system to provide social security for individuals who do not have any sources of income.

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[4] The former is a variant of the liberal welfare regime while the latter is an hybrid of the liberal and the conservative-state corporatist welfare regimes, although they have indigenous characteristics.

- **The Social Policies:** Family, as a welfare producer unit, is at the core of the system. A needy individual should be supported primarily by his/her family in terms of income security and shelter. In that sense, mothers are responsible for caring children and older individuals. Local governments, charity organizations, and religious institutions are also important welfare providers. Being a participant of any publicly financed welfare programs is subject to favoritism and there are strict eligibility conditions to be a recipient of unemployment insurance. Absence or deficiencies in the vocational education system feeds not only income support necessities of disadvantaged individuals but also do not allow them to shift into a better labor market segment.

Some member states of the European Union, such as Greece, Italy, Spain, and Portugal, are prototypes of the Southern Europe model. From 1970s, changes in their domestic political environment and accessions to the EU[5] and the globalization process had greater impacts on the labor market regulations and the welfare state practices. It is stated that atypical development phases of these countries in economic, cultural, social and political dimensions caused deteriorated provisions of the welfare. However, integration to the European social model via EU's directives and intellectual supports, uptrend in the center-left political parties who modify the social inclusion through the expansion of the child- and the elderly-care services and decentralizes the welfare provision responsibilities served opportunities to conduct the reforms in the Mediterranean countries (Marí-Klose & Moreno-Fuentes, 2013, 483-4). Karamessini (2007) highlights that reforming efforts led to the *slow but constant* transformation in the elements of the model. Family, which is at the core of the model, erodes via increasing female labor force participation which increases the living-standards of the family. The institutional changes in the labor market aim to increase the wage setting and hiring/firing flexibility in order to gain the international competitiveness. The vocational training systems have been reformed but the skill composition of the employment is still worse than the EU-25. The coverage of the unemployment insurance system despite improvements, is still the lowest in the former EU-15. The pension systems are extended via non-contributory programs that are fi-

[5] Italy, which is one of the six founders of the European Economic Community (EEC, today EU), had experienced longer strikes, known as hot autumn, of workers in the industrialized North in 1969-70. The authoritarian/dictatorship regimes were in charge in Greece (the Regime of Colonels, 1967-1974), in Spain (National Movement of Franco, 1939-1975), and in Portugal (Estado Novo (New State) of Salazar, 1933-1975). Greece joined the union in 1981 while Spain and Portugal became the member of the union in 1986.

nanced by the taxation and the social security institutions are unified to reduce fragmentation. Moreover, immigration and the youth unemployment enlarge the underground economy. The private health-care provision activities and the role of the state in childcare services grow.

According to Buğra and Keyder (2003), Turkey belongs to the Southern European model of social policies due to several commonalities but highlights the convergence that took place in the EU member Mediterranean countries to the European common welfare practices. Grütjen (2008) compares indicators of Turkey with four typical Southern European countries mentioned above and concludes that except civil society's, market actors' and regional authorities' impacts and absence of universalistic health system, Turkey is "the ideal" type of Southern European Model. On the other hand, Aybars and Tsarouhas (2010) states that the Turkish welfare regime is an hybrid of the Southern European model and Middle Eastern welfare system. The authors state that clientelistic and residual social assistance scheme, religiously dominant political ideology, huge gender differences in educational attainment, lower female labor force participation and high fertility are basic characteristics of the Middle Eastern welfare regime. They also highlight the EU's influences on the policy reform initiatives to explain the differences between Turkey and Middle Eastern countries but they conclude that Turkey's efforts towards the EU will be end up with having pure Southern European welfare model.

The practices of the welfare regime in Turkey had been started in the second half of the $20^{th}$ century by formation of the social security system. Until 2005, there were three different institutions which were organized according to employment status of workers. Economic crises (1994, Asian crisis of 1997-98, Russian crisis of 1998), earthquakes (1999) and expansions in the participants to the non-contributory programs and their costs due to higher informality worsened their balance sheets and transfers from the central government to cover their deficits increased. Therefore, in the beginning of 2000s, social security reform was enacted in which firstly retirement age has been raised in echelons and then these three institutions were combined under the name of Social Security Institution in 2006 as a division of the Ministry of Labor and Social Security.

The first social assistance program, i.e. the old-age annuity, of Turkey was enacted in 1976. Eligibility conditions of the program was having an age of 65+, having no social security coverage, having no income generating property and any other source of income, and having

no close relatives to take care of them. As mentioned by Buğra and Keyder (2005a, 28), disabled and elderly individuals are out of the targeted groups. The first social service institution, Social Service and Children Protection Institution, was formed in 1983 (Metin, 2012).

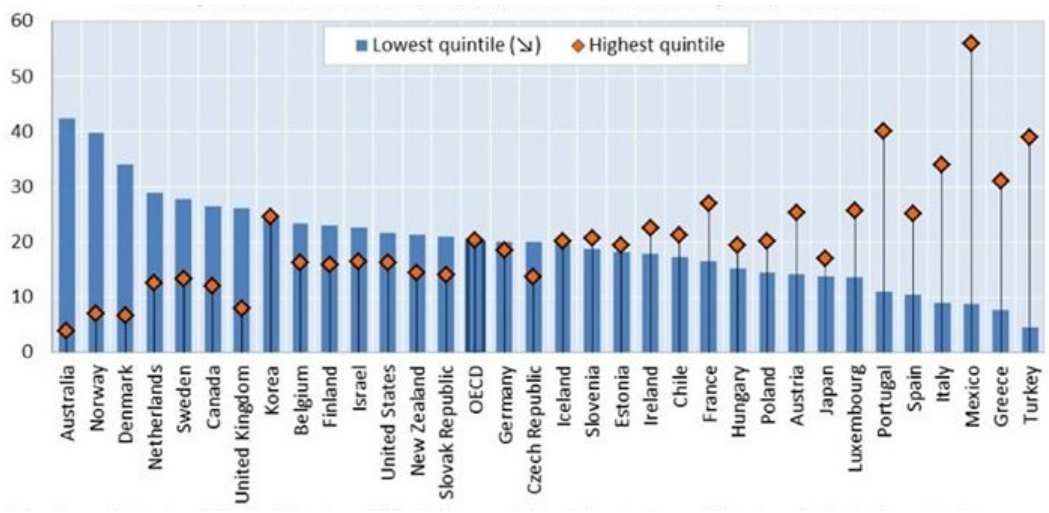
The first social assistance institution, Fund for the Encouragement of Social Cooperation and Solidarity, was established in 1986 under the administration of Prime Ministry and tasked with performing social assistance programs. The fund's organizational structure was based on Social Assistance and Solidarity Foundations in all counties and provinces. The board of trustees of these foundations in provinces constitutes several provincial public authorities (governor is head of the board), representatives of two NGOs and two philanthropists. Şenses (1999) analyzes the first decade of the Fund and emphasizes that introduction of poverty alleviation into the policy agenda and its contributions to increase living conditions of poor households are important but its effectiveness is questionable against changing structure of the economy in terms of technological improvements and the composition of employment.

There were several institutions to conduct social policies with different areas of responsibilities. As mentioned by Yentürk (2013), collection of data on social protection expenditures (the central government's expenditures on health, social security, social services and social assistance) required to trace 55 different institutions' budgetary figures and activity reports. This non-unity was a political choice to avoid transparency and accountability in public fund usage (Buğra & Adar, 2007), which caused accusations of the administrations as being politically prejudiced (Şenses, 2010). The unification of several administrations under the Ministry of Family and Social Policies has been performed in June 2011.

The welfare regime of the last decade is at the center of political as well as economic debates. The main critique is escalation of payments mainly in pre-election periods. The following quotation, Bahçe and Köse (2014, 27), is a brief comparison of the pre- and post-2002 welfare regimes;

> "This new welfare regime has been arising upon new principles like selective coverage, informal transfer mechanism, discretion, private initiative and irregularity. These principles are in direct contradiction with the principles of former state-centric and state-funded welfare system like regularity, constitutionally guaranteed non-selective transfer mechanism, full coverage objective, and rule based distribution. The new welfare regime provides a very crucial tool for the redistributive politics"

The figure below shows the share of cash social benefits receiver households' by their respective income quintile and provides a proof for the quotation above. Turkey, after Mexico and Portugal, occupies the third rank in the skewed distribution of cash benefit payments in favor of the richest income quintile. The figure also confirms the observation of Buğra and Keyder (2003); Turkey is followed by Italy, Greece and Spain which, with Portugal, constitute the major prototypes of the Southern welfare regime. The report highlights that this is the result of social transfer scheme in which payments heavily depend upon working history in formal jobs and pension payments OECD (2014, 5). Balaban (2014) analyzes Turkey's performance of social inclusion practices in 2000s by comparing it to average of the EU-27 and states that either increase in the social expenditures relative to GDP is not sufficient or that there are deficiencies of the methods of operations since social transfers' effects on the poverty rate is negligible relative to the EU-27.




***Source:*** OECD (2014)

**Figure 2.1: Who are the receivers of cash benefits?**

The Bertelsmann Stiftung (BS) constructs a Bertelsmann Transformation Index (BTI) to assess country-level political and economic transformations. For each country report, experts (one local and one international) are requested to evaluate the welfare regime by giving a score on two questions[6]. The first question is related with consumption and insurance characteristics

[6] Turkey has the second best rank among 19 countries in the MENA region and she is $18^{th}$ among 129 countries with her overall welfare regime score which is 7. The other countries who have the same overall score are Macedonia, Montenegro, Romania, Serbia, Brazil, Qatar, Botswana, Mauritius and Malaysia.

of the welfare regime while the second question measures that how the welfare regime makes investment in social areas to support her citizens in their skill acquisition process (Kitschelt, 2015, 6). The experts' scores are 7 to both questions, in a scale out of 10 and their assessment in the social safety nets area is that there are some improvements but the size of the informal sector hinders further progress. On the other hand, their appraisal on the equality of opportunity has problematic parts. The experts argue that female labor force participation is still one of the lowest in the OECD members in spite of all *considerable* efforts of the government and the parliament, (BS, 2016, 19), but they do not mention the recently enacted policies to increase fertility. For instance, women are allowed to be on non-paid maternity leave up to 2 years and they can pay their social security premiums to add these years to their retirement age calculation. When the situation of members of some religions or minorities is considered, the score of "7" is questionable.

In Turkey, absence of reliable statistical data for a long series of time is a major problem, especially in the policy evaluation. From the beginning of 2000s, due to adjustment to the EU legislations, the availability of data sets have been increased. The first Turkey-wide household survey was conducted in 1987, the former version of Household Budget Survey. This survey is conducted by TURKSTAT annually. It is designed for the purpose of data collection on socio-economic status, consumption expenditures and income components. From the first implementation in 1987, so-called Household Income and Expenditure Survey (HICES), it was updated several times and the current version of it has been implemented since 2002 to provide more qualified and comparable data series which are not affected from external conditions (national election, natural disasters, economic crisis etc.). The survey is the major data source of household level analyses since it has a representative power in terms of household level information. HBS provides a cross-section dataset, i.e. the survey does not trace individuals in consecutive years. Thus, in 2006, TURKSTAT has been started to implement Survey of Income and Living Conditions (SILC) which is the first longitudinal dataset of Turkey. Each household participates to the annual survey for four consecutive years and SILC provides cross-section data as well.

Due to absence of data, researchers tried to conduct analyses by collecting their own data. Yükseler (2005, Table 1, p. 58) compares eight different income distribution analyses for

Turkey between 1963 and 2003[7]. According to the results, Gini coefficient was higher than 0.5 until mid of 1980s and it dropped to 0.43 in 1987, while it was 0.49 in 1994 and 0.42 in 2003. On the other hand, Gürsel et al. (2000) highlights the importance of adjustment of household income according to the size and the composition of household, i.e. the importance of using equalized household income, and conclude that exact conclusions on increasing income inequality between 1987 and 1994 may be misleading.

Selim and Şenesen (1999) states that progressive income taxation, enacted in 1960s, led to improvements in personal income distribution but unadjusted income brackets in 1970s, despite high inflation, vanished progressive structure, while widening exceptions and exemptions for high-income groups in 1980s deteriorated personal income distribution. Boratav and Yeldan (2001) states that historical problems (oligopolistic industry and banking sector, huge and low-productive rural population employed in agriculture and invoked migration) could not be solved during 1980s due to clientelistic allocation of export subsidies and grants. Moreover, since industrial wages were treated as "high", they were repressed which, in turn, led to widening in wage differentials between skilled and unskilled workers and increasing informality and the share of non-wage income in national income. As a result, both size and functional income distributions were worsened. The findings of Özmucur (1996) support deterioration in functional income distribution; the share of total wage income in GDP was almost stable around 30% until the end of 1980s. Between 1991 and 1993, it increased to 35% and crashed to 26.5% in 1994. Güneş (2007) analyzes the functional income distribution in Turkey for 1987Q1-2005Q4 and concludes that, in contrary to the general belief as he mentioned, functional income distribution has not been changed significantly.

The analyses of 1994-2011 HBSs of Filiztekin (2015) suggest that, on the contrary to the common findings of the literature, income inequality in Turkey improved throughout 1990s due to declining within-group inequalities despite unstable macroeconomic environment. Until 2007, as gross domestic product increase, between-group income gap narrowed but in the aftermath of the global crisis, the trend has been reversed. The author claims that income distribution is basically determined by the levels of education and occupations of the heads

[7] Surveys of three of them (1963-68-86) were conducted by academics, by the State Planning Organization (predecessor of today's Ministry of Development) in 1973, and by the State Statistical Institute (predecessor of today's Turkish Statistical Institute) in 1987-94-2002 and 2003.

of households. Güven et al. (2014) provides gender-based income inequality analyses by using the SILC for the period of 2005-2010. They find that between-gender income inequality is high but intra-gender inequalities are superior; the role of gender in income inequality is lower. The results of multinomial logit analyses postulate that there is an inverse relation between the level of education and probability of transition to lower income level. Therefore, the authors highlight the importance of easy accession to qualified education opportunities for children who live in low income households to reduce income inequality.

There are limited number of studies that focused on the effects of the government policies on the income distribution. Gürsel et al. (2000) states that the majority of public transfers are devoted to the richest households but analyses of pre- and post-transfer equalized household income postulate that these transfers reduced Gini coefficient by 5.3% in 1994. Yükseler and Türkan (2008) mentions that between 1994 and 2002, income tax and transfer policies of the government affected the income distribution in a positive manner, although their total effect is less than half of the major EU and Nordic countries[8]. In the aftermath of 2002, the effects of these policies decline since the share of indirect taxes in GDP grew faster than that of social and health expenditures.

Yakut-Çakar et al. (2012) asks the question of "what would be the poverty rate if there exist a minimum income scheme?". The results of SILC-2007 reveal that the cost of covering households whose median-equalized household disposable income is below 40% (60%) of median income is equal to 0.33% (2.7%) of GDP, while changes in the Gini coefficient is limited in the first case but it drops to 0.359 in the latter scenario. SILC analyses of Başlevent (2014) concludes that social assistance payments have strictly positive impacts on the income distribution but it is very small since the share of these payments, including disability benefits, is not larger than 0.5% in total household income. The author also highlights that inter-household transfers between relatives play a non-negligible role in enhancing social justice. Bahçe and Köse (2014) provides a class-based analyses of HBSs for 2002-10. They assign each household into a unique class and examine within and between classes effects of changing public transfer policy. Changes in the class composition (increasing size of la-

[8] The results reveal that redistribution policies drop Gini coefficient almost by 50% in Sweden, Denmark, and Belgium (Yükseler & Türkan, 2008, 131)

bor classes and decreasing peasantry and petite bourgeoisie) negatively effected the income distribution, while the selective social assistance payments hindered the rise in inequality between classes. Class-based Gini coefficient calculations postulate that the first half of the period witnessed a decrease in Gini coefficient while in the second half, it increased. More recently, Şeker and Dayıoğlu (2016) analyzes the effects of the global financial crisis by utilizing 2008-10-12 waves of SILC. In 2009, proportion of non-contributory (85% of total) transfer recipient households was higher by 5 percentage points than 2007 and more than 60% of the poorest quantile were recipients of those. As income of household increases, the share of contributory transfer programs (pensions etc.) increases; 14% (9.3%) of household disposable income of the richest (poorest) quantile. The authors show that non-contributory transfers have negligible but enhancing effects on income inequality. Thus, they conclude that in addition to employment preservation affords, the government aimed to avoid decline in household income by increasing transfer payments to relatively poor households.

## 2.4 Current Social Programs

The current framework puts the family into the center of social transfers but it also comprises several types of transfer programs that are designed for elderly, disabled individuals in a unilateral manner. On the other hand, some of the transfers are paid conditionally for educational purposes and health-care.

**Table 2.1: Aggregate Figures on Social Policies**

| | **2013** | **2014** | **2015** |
|---|---|---|---|
| Total Social Transfer Expenditures, as of GDP (%) | 1.35 | 1.38 | 1.33 |
| Number of Families that Receive Only Regular Aids | 1,099,183 | 1,113,242 | 1,093,320 |
| Number of Families that Receive Only Temporary Aids | 837,755 | 731,716 | 699,927 |
| Number of Families that Receive Both Types of Aids | 1,159,551 | 1,160,940 | 1,224,722 |
| Total Number of Families that Receive Aids | 3,096,489 | 3,005,898 | 3,017,969 |
| Number of Individuals that Receives Old-age and Disabled Pension | 1,222,748 | 1,300,377 | 1,272,038 |
| Share of Population under $2.15 Daily Purchase by Current PPP, % | 0.06 | 0.06 | 0.03 |
| Share of Population under $4.30 Daily Purchase by Current PPP, % | 2.27 | 2.06 | 1.62 |

***Source:*** ASPB (2013, 2014, 2015)

In Table 2.1, some aggregate figures for social policy in Turkey are given. In the last three years, total social transfer expenditures to GDP ratio is stable around 1.35%. Number of families that receive a transfer payment, either cash or in-kind, is also stable around 3 million while number of households that receive temporary aid such as food, shelter, fuel etc. decreases gradually. In the remaining part of this section, transfer programs, their target groups

and eligibility conditions are presented. Lastly, developments in the field of linking the programs to lead the recipients to employment are summarized.

**Transfers to Families**[9] are either cash or in-kind benefits that are paid to households whose per capita income is below one third of the net minimum wage. Unless otherwise stated, this criteria is the major criteria to be a recipient.

- **Food Aid:** Cash & in-kind payments to families who meet the major criteria without social security in order to cover their food and clothing needs. This is a temporary program since these transfers are made before Ramadan Feast and Sacrifice Feast.
- **Shelter Aid:** Cash & in-kind payments to families who meet the major criteria and whose dwelling is old, squalid and unhealthy. This is a temporary program and includes rent allowances.
- **Social House-Dwelling:** In cooperation with Housing Development Administration (TOKİ), social houses are constructed for families who meet the major criteria without social security. The cost of the house is paid by households in a maturity (270 months) thats is longer than any mortgage credit maturity (120 months maximum).
- **Fuel Aid:** Once in a year, a half ton of coal is paid to families who meet the major criteria.
- **Aids to Females whose Husband Died:** Females whose last husband is died, she and any other individual within the same households who do(es) not have a social security are paid monthly by 250 TL since 2012.
- **Birth Aid:** For the first, the second and the third born alive child, 300 TL, 400 TL and 600 TL is paid, respectively, since May 2015.
- **Orphan Aid:** Child who is younger than 18, his/her mother or father died is paid by 100 TL per month.
- **Other:** There are two different programs for relatives of an individual who serves his compulsory military service. The eligibility condition is having no social security and a proof of being needy. One of the programs covers wife or parents of individual while the other covers children of individual.

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[9] This section is translated and summarized from ASPB (2015).

**Transfers by Educational Purposes**

- **Course Material Aid:** The basic educational materials such as stationery, school uniform, shoe except course book are covered.
- **Conditional Aid:** It is conditional cash transfer program which aims to increase school enrollment of children in the needy families. The payments differ by the level of the school (primary, middle and high school) and by gender (payments to girls are higher).
- **Lunch Aid:** Lunches of those students whose transportation, especially from villages to schools in rural centers, is covered by the government is paid.
- **Course Book Aid:** Since 2003, course books are distributed to all students for free of charge.
- **Transportation of Disabled Student:** Disabled students who need special education are transported to their school for free of charge. Initially, only mentally retarded and autistic students were eligible while the coverage has been extended to whole disabled groups in 2005.
- **Dormitory Construction**

**Transfers by Health Purposes**

- **Conditional Aids:** It has two aims. The first is to ensure that children of needy families can reach to basic health services regularly. The payment is made until child is six years old. The second aim is to ensure that pregnant women get regular health check and give birth at a health-care institution. The payments are made during pregnancy and there is a lump-sum payment if the delivery takes place in a hospital.
- **General Health Insurance Premium Support:** As of January 2012, General Health Insurance (Law no. 5510) was enacted and individuals who do not have a social security have an obligation to pay general health insurance premium. For needy individuals, this premium is partly or entirely covered by the MoFSP. The amount of premium support is calculated according to per capita household income for which there are four thresholds. If per capita household income is below one third of the net minimum wage, individuals are exempt of premium payment.
- **Aids to Disabled:** Any equipment necessities of disabled individuals are covered.

**Transfers by Special Purposes**

- **Soup-kitchen:** In the areas where unemployment and poverty are relatively higher,

daily meal is provided for elderly, disabled, solitary and sick.

- **Disaster or Emergency Aids:** The basic necessities of individuals who suffer from a natural disaster are covered such as food, clothing, shelter etc.
- **Other:** Payments for Syrian refugees[10] are classified in this category.

**Transfers to Elderly and Disabled**

- **Payments under the Coverage of Law 2022:** The Law no. 2022 enacts cash payments to needy Turkish citizens and covers three groups of individuals. The first group covers individuals who are older than 65 years old, do not have a social security and per capita household income is below one third of the net minimum wage and old-age annuity is paid to those individuals. Disabled individuals who are older than 18 years old and relatives who are responsible for care of the disabled people are covered in the second group. Third group constitutes individuals who lost his/her workforce by at least 15% due to silicosis disease and do not get any income.
- **Care at Home Aids:** The entire necessities such as personal care and psycho-social support services on 7/24 basis of disabled individuals are covered. The eligibility conditions are having high-degree disability approved by a health report, having a per capita household income below **two thirds** of the net minimum wage and one of the family member has to spend his/her time with disabled individual at least 8 hours per day.

**Project Support and Employment Aids**

- **Revenue Generating Projects:** Needy individuals / families are supported to establish their own business to sustain their own livelihood. In this respect, the following area are supported: plant and animal productions, agricultural product process, hairdressing, tailoring, restaurants, plumber etc.
- **Social Support in Rural Areas:** Individuals who do not have sufficient resources to conduct agricultural activities such as sheep breeding, greenhousing are supported. The eligibility condition is joining into a cooperative that is related to such an activity.
- **Social Services Projects:** The aim is to extend the social services that are produced for homeless children, children at work, disabled, elderly, unemployed youths and needy individuals.

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[10] In the report, Syrian people are called as “guest”.

The major problem of the recent social programs is to establish links between the programs and employment. Since April 2010, social transfer recipients have been registered to database of the Turkish Labor Agency (İŞKUR) which is responsible to provide the service of job and employee agency effectively via implementing active labor market policies to improve the employability of workforce. In 2015, the recipients are supported in several ways to lead them to labor market participation. For instance, the recipients are paid (max.) 100 TL in three times per year for the costs of job interviews, medical reports, and other necessary documents. If the recipient can find a job, one third of gross minimum wage is paid once as a job replacement aid. If her/him labor market participation is continuous, she/he is considered to be preferential in coal, education, and food aids. As a sanction of not to participate into labor market, cash benefits -excluding regular aids- of household are canceled. According to ASPB (2013), in the period of 2011-13, 43.054 recipients led to employment. İŞKUR (2015) states that total number of job replacements between 2011-15 is 65.260. In 2014 and 2015, 509 and 1.584 recipients benefited from leading to employment and from (one shot) job placement aids, respectively, whereas the costs of these two programs were 51.316 TL and 357.920 TL, in nominal terms. These figures relative to the total number of beneficiary families are too small. This indicate that these policies are not implemented effectively, despite the importance of the issue.

# CHAPTER 3

# THE MODEL ECONOMY

This Chapter introduces the basic modeling framework constructed and utilized throughout the Thesis. In order to be able to emphasize the contribution of the Thesis, this Chapter first provides an overview of the literature that utilizes similar approaches to analyze the issues of income distribution. Next, the modeling framework designed and utilized in the Thesis is described. Here the emphasis is on the elements that crucially describe the characteristics of the modeling environment to study questions on income distribution in a macroeconomic framework.

## 3.1 Literature Review

There are two basic definitions of the income distribution. The first is called as functional income distribution and it measures distribution of income among factors of production such as labor, capital, and land or among different socioeconomic groups such as occupation, sector of employment, region, educational attainment, level of skill, etc. For the second grouping, Lofgren et al. (2003) uses the term "extended functional income distribution". The second definition is the distribution of income among individuals, so-called size distribution of income. As stated by Boratav et al. (2000, 18-9),

> functional income distribution or income distribution between socio-economic groups provide appropriate conceptual frameworks for studying the linkages, which shape the distributional dynamics including the impact of economic policies. Size distribution of income, on the other hand, is **the statistical end result** of these relations of distribution.

For detailed labor market structure, change in sectoral demand for a particular type of labor would lead to differentiated effects on the other types of labors. Since wage income is the basic source of income of households, especially for less educated and unskilled households, household disposable income is affected. Moreover, changes in the government indebtedness or transfer scheme or tax policies, so-called redistribute policies, also alter the disposable income of households. The effects of external environment such as changing terms of trade, interest rate in the international markets or country-specific effects such as deterioration/improvement in the perception about the country resulting increasing/decreasing risk premium would change income sub-items and / or their distributions among households and thus the disposable income of households. As disposable incomes change, the size distribution of income also changes. Hence, analysis of the size distribution of income requires a comprehensive methodology which incorporates behaviors of different economic agents and the relations among them. In this respect, CGE models are widely used to analyze the size income distribution since they allow researchers to consider several dimensions simultaneously in a broader and a consistent framework.

In terms of time dimension, CGE models can be disaggregated into three groups. The first group of studies totally ignore time dimension and called "static" models. In this setup, the model is solved for a benchmark case and for a policy shock and two sets of results are compared in a comparative static manner. The second group is the extended version of the first group in the sense that it comprises a static part but some of the variables such as capital stock, population, etc. are updated exogenously. In this case, static part is solved by ensuring equilibrium in all markets (within-period equilibrium) and the results are used to update the dynamic part (between period equilibrium) and the static part is fed again. Therefore, static part and dynamic part are solved sequentially and these models are called "recursive dynamic" or "sequential" models. In the third group, time dimension is fully anticipated. All agents know the length of their economic life and adjust their decisions in every period of time as a forward-looking agents. These models are called dynamic" or "intertempora" models. In the former two, since time perception of agents is either absent or limited, within-period behavior of each agent is assumed to be fixed. For instance, households devote pre-determined fraction of their income to savings. On the other hand, dynamic models allow us to fully endogenize saving behavior of households. Springer (1998) states that in the recursive dynamic

models, agents have myopic and adaptive expectations while in the intertemporal models, their expectations are rational since they take into account all available information (basically future streams of commodity and factor prices) throughout their economic life[1].

In the CGE literature, representative agent approach, as used in this dissertation, is a common way to incorporate household and firm structures. In this setup, the basic idea is that a person's (firm's) problem is identical to many individuals' (firms') problem who have common socioeconomic characteristics (operate within the same sector). The alternative of this approach is incorporating each individual and firm into model as a separate agent. To do this, a technique, namely microsimulation, is used[2]. In this framework, each individual's income generation process is modeled by using individual and household level characteristics and the data comes from a micro-level large-datasets, such as Household Budget Surveys. Structural estimation methodology is utilized in which family utility is maximized to take into account the interdependencies among the members. Due to over-aggregation of the micro behavior, representative agent approach limits the frontiers of the analysis and thus a CGE model could make conclusions on the between-group inequalities. On the other hand, microsimulation also allows researchers to analyze the within-group inequalities.

In the remaining part of this section, CGE analyses of the income distribution according to aforementioned approaches are summarized. For details of the studies, see Appendix B.

### 3.1.1 Representative Agent Approach (RA)

This modeling approach is utilized inevitably if there is no household survey. In this case, for instance, change in per capita consumption expenditure is used as a proxy for poverty indicator, Moreira and Bayraktar (2008). More common application of this approach is introducing multiple representative household groups that are differentiated according to several criteria such as area of residence, level of education, etc.

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[1] Having information on the future streams of prices is the basic consequence of deterministic models in which there is no uncertainty. For a brief survey of CGE literature with uncertainty, see Fehr (2009).

[2] Throughout the section, studies with household level microsimulation analyses are considered. For firm-level microsimulation within a CGE framework, see van Tongeren (1998).

As a part of an Organization for Economic Co-operation and Development (OECD) project, the effects of structural adjustment programs[3] on the income distribution in six countries are evaluated. Among these, de Janvry et al. (1991) for Ecuador and Thorbecke (1991) for Indonesia are the most cited ones. The latter takes the adjustment program implemented by Indonesian government to cope with economic slowdown in the beginning of 1980s as a benchmark case. Then, examines several policy changes by utilizing a financial RA-CGE model and concludes that the program is superior to the proposed policies in terms of achieving equilibrium, improving income distribution, and reducing vulnerability of the economy to external shocks.

The analysis of Turkey's accession to Customs Union (CU), de Santis (2000), shows the importance of the labor market treatment[4] when the concern is income distribution and welfare. Harrison et al. (2003) analyzes the effects of CU on poverty in Turkey via Pareto-type *sidepayments*. Since compensating welfare loses of poor households do not lead to Pareto

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[3] During 1980s-90s, due to acceleration of the globalization process with increasing magnitude of the financial inflows, several under-developed / developing countries faced severe economic crises. Although the domestic origins are different, the common external factors behind these crises are deterioration in terms of trade and increasing interest rate in the international markets. The former may cause an economic crisis if terms of trade changes in favor of (against) industrial (agricultural) commodities since these countries are major importers (exporters) of these goods. In this case, balance of payment deficits enlarges and borrowing requirement of the economy expands. Since infrastructure expenditures are major components of the development process and these countries lack funds to finance these expenditures, they need to borrow from international markets. As interest rates increase, the cost of borrowing increases and debt-servicing becomes harder. In order to eliminate the negative consequences of balance of payments difficulties on the international economic system, International Monetary Fund (IMF) or the World Bank (WB) have designed adjustment programs. The major aim of these programs is to reduce public indebtedness via improving the primary balance (government revenues minus expenditures except interest payments) of the government. Thus, the programs impose restrictions on all kinds of public expenditures and force them to increase their revenues from all available sources such as increasing tax rates, widening tax base, privatization, etc. Obviously, these policies reduce purchasing power of the country and cause further distorted income distribution and deepened poverty. The other country analyses of the project are Morrisson (1991)- Morocco, Lambert et al. (1991)-Côte d'Ivoire, Demery and Demery (1991)-Malaysia and Meller (1991)-Chile.

[4] One of the major problems of labor market treatments in CGE framework is to solve unemployment and wage rates simultaneously. These two may be economy wide variables if there exist one type of worker, or regional variables if there exist multiple regions within the model or labor-type specific variables if segmented labor market approach is utilized. There are three methods to solve the problem. The first is called search and matching which is more appropriate to explain the short-run dynamics of unemployment, i.e. frictional unemployment. The second method incorporates individual or collective bargaining procedure between firms and the individual or union, respectively. The third is introducing a wage curve in which unemployment rate and wage rate are negatively related. For detailed description of the methodologies and applications in CGE framework, see Boeters and Savard (2011).

improvements, they propose preserving protection in motor vehicle sector which have the highest adverse effects on welfare of the poor. Moreover, revenue compensation alternatives due to declining tariffs have different welfare impacts.

The composition of public expenditures is also important in poverty alleviation. The literature argues that increasing the number of education facilities, easy accession of individuals to them, and the quality of these services improve human capital. Increasing human capital allows individuals to find better jobs in terms of renumeration and social security coverage and, in turn, allows them to survive by their own effort. Cloutier et al. (2008) examines the reduction in higher education subsidies accompanied tax cuts in Vietnam. The results of a static CGE analysis support the general idea on the negative effects of cutting public education expenditures on the income distribution via increasing cost of education and reducing educational attainment of the poor households. Jung and Thorbecke (2003) modifies a usual neo-classical multisector dynamic RA-CGE model by mapping public education expenditures to human capital accumulation for Zambia and Tanzania. Households are identical except the degree to access to the education facilities which hinders their educational attainment and thus wage income. The first outcome of decreasing real education expenditures by 15% is reduction in poverty but the strategies should take into account the factor endowments and the technological abilities of the countries. Secondly, the effects of increasing expenditures would be lower if they are not formed to target a specific group, such as rural households. Thirdly, higher flexibility of labor market would support higher employment growth which is the main source of poverty reduction. Lastly, human capital accumulation should be supported by increasing private and public physical investment expenditures to ensure more balanced growth in rates of return of factors of production.

In addition to health and education, public expenditures on the infrastructure would also make positive contributions to the income distribution via increasing the productivity of the private capital stock. The results of Dissou and Didic (2011) who uses a dynamic multisector multi-household RA-CGE model reveal that increasing the stock of public infrastructure affects the functional income distribution in favor of labors and its effect is higher when there is no distortionary taxation. Buffie and Atolia (2012) analyzes three cases in which the government devotes the resources to only infrastructure or only to education or a mix of these two within a dynamic RA-CGE for Zambia. The results postulate that mixing these two investment ex-

penditures is superior in terms of GDP growth, poverty reduction, and distribution of income gains across classes. Recently, Latorre (2016) analyzes the effects of foreign direct investment and tariff reform in Tanzania via gender-based static CGE model that incorporates multinational enterprises and imperfectly competitive sectors. The productivity gains increase factor incomes while the effects are the lowest for less skilled females.

### 3.1.2 Microsimulation Approach (MS)

The major aim of this modeling strategy is making the within-group income distribution endogenous and there are two options. In the first, each household can be separately introduced into the CGE model. The second approach constitutes three steps. The first is construction of a microsimulation module (MSM) to generate income distribution. The second step is construction of a RA-CGE module to generate macroeconomic results after a policy shock. The third step is either running RA-CGE and obtaining results to feed MSM or doing it sequentially (run RA-CGE - feed MSM - update results - feed MSM so and so forth) until getting a convergence, while it is not guaranteed in this methodology (Boccanfuso et al., 2008). The former approach solves all agents' problems simultaneously with changes in prices, tax rates, etc. while in the latter, behaviors of agents are assumed to be unchanged. Bourguignon and Spadaro (2006) calls the former as "behavioral MS" while the latter as "arithmetic MS" and provides theoretical backgrounds of both types of MS models and extensive literature survey.

In the MSM/RA-CGE approach, each household in the survey is assigned to a RA group by using several criteria and their individual information on income and consumption are aggregated to produce the RA level information. The third step of the second approach has two alternatives to feed MSM. In the first, for each RA defined in the CGE module, a probability distribution function is chosen with fixed variance to portray within-group income distribution. Then, for each simulation in the RA-CGE module, the poverty line and the size of population of each RHG are given to the MSM to measure changes in the income distribution and poverty. The second approach is using the results of RA-CGE module to change income and consumption of each household in the survey without imposing any functional form on the within-group distribution. For instance, change in the income of the RA group is used to calculate changes in income of all households who belong to this RA group. In this

part, according to the level of details in the survey data and the RA-CGE module, not only total income and total consumption but also all their sub-items can be updated separately. Lofgren et al. (2003) states that the second approach, i.e. not assigning a functional form on the within-group distribution, is a closer methodology to an explicit MS approach since it utilizes directly all available information provided by the survey. Davies (2009) provides a survey on MSM/CGE models and compares fully integrated and layered (models with two in(ter)dependent modules) models. The former is cleaner and more transparent in terms of modeling exercise and displaying the direction of changes in the income distribution indicators. On the other hand, the latter is a better modeling choice for the short-term analyses.

The studies that assign a functional form for the within-group income distribution utilizes log-normal and Beta distributions commonly due to their tractabilities. However, Boccanfuso et al. (2008) compares seven different functional forms by using the results of a fully integrated CGE model and concludes that statistical goodness-of-fit of the functional form should be tested since there is no valid form for all cases and arbitrary choices may lead biased conclusions. One of the mostly cited CGE analysis of the income distribution is served by Derviş et al. (1982) since it provides a theoretical contributions to the development policies with applications of the CGE framework. The authors simulate alternative policy scenarios for Turkish economy's foreign exchange crisis in 1973-78 period by constructing a recursive-dynamic CGE model. The experiments reveal that freely floating exchange rate lead to improvement in net exports and thus increase in GDP. de Janvry et al. (1991) uses a Pareto distribution, with a group-specific parameter $\theta$ which is estimated to characterize the frequency distribution. In addition to detailed financial CGE model, a political feasibility index is incorporated into the model. The results reveal that reducing the government expenditures is the best policy choice to induce the economic growth and to protect the rural poor households but it is politically infeasible. It should be strongly stated that studies that cites de Janvry et al. (1991) do not mention this feature of it but, in fact, political feasibility is the most important aspect of ***any*** policy change. Decaluwé, Patry, et al. (1999) provides poverty analyzes within a static RA-CGE framework[5]. The basic contribution of this study is utilizing a Beta distribution which depends upon minimum and maximum income within the group and skewness of the distri-

[5] The authors firstly construct a SAM for an archetype African economy by explaining the entire process and then conduct a multiplier analysis to examine the effects of changing agricultural exports on the income distribution.

bution. This distribution function is superior among others since it is more flexible while its deficiency is that it has constant parameters which determine the skewness of the distribution. Due to this deficiency, with an exogenous and constant variance, the within-group distribution responds to an external shock by proportional shifts.

The frontier of enriching a CGE analysis in terms of household heterogeneity is incorporation of all households individually into a CGE model. The first attempt of such an analysis is conducted by Decaluwé, Dumont, and Savard (1999). The authors construct an artificial SAM that contains 150 households which are entirely integrated into the CGE model. The results postulate that endogenizing intra group distributional effects is important although it makes the modeling exercise cumbersome. The first application of this approach by using real data is Cogneau and Robilliard (2000) for the Madagascar economy and concludes that it is difficult to alleviate poverty by using cash transfer schemes in a country in which 67% of households' income is below the poverty line. Bourguignon et al. (2003) compares the results of MSM/RA-CGE approach and RA-CGE approach by conducting the same set of experiments and concludes that the first approach reveals increasing inequality while the latter shows no change and the magnitude of changes in the poverty measures are relatively higher in the first approach. Their explanations are that MSM explicitly covers the effects of changes in occupations and consumption behaviors of individuals.

The analysis of Mexican welfare program so-called PROGRESA, Coady and Harris (2001), is the first study in the sense that each household's total income and its sub-items are updated separately. Replacement of food subsidies by a conditional (school attendance and health clinic appointments) cash transfer program causes the largest benefits for households in the poorest regions. Moreover, increasing the efficiency of tax system (removal of agricultural subsidies or increases in value added taxes on necessities) reduces the negative impacts in the urban areas while leads to higher incomes in rural areas.

The studies mentioned above use static CGE models while the results of fully integrated recursive-dynamic CGE analysis of Annabi et al. (2005) for Senegal clearly shows the importance of the growth component in poverty reduction, especially for households who are around the poverty line. Although time dimension is important, recursive dynamic models may lead biased results due to their myopic structure in terms of expectations. In that sense,

Agénor, Izquierdo, and Fofack (2003) contributes the literature by constructing one of the most detailed model, namely IMMPA-Integrated Macroeconomic Model for Poverty Analysis[6]. They utilize so-called "simple micro-accounting method" in which growth rates of per capita disposable income and consumption are used to produce post-shock values in order to evaluate changes in the income distribution. Agénor et al. (2004) proposes a new methodology, namely "reweighting technique" in order to extend the MSM feeding mechanism used in Agénor, Izquierdo, and Fofack (2003). The logic behind the technique is as follows. In the usual framework that links household survey and macro model, rank order of households do not change although their sector of employment change. Thus, they change the weight of each household by altering the distribution of desired characteristic(s) (here, it is the sector of employment) and by preserving the joint distribution of the other characteristics. To conduct such an analysis, the authors tailor the original model's financial side (thus, they called the new model as mini-IMMPA) and calibrate the model to a middle income country by generating a household survey with 5,000 households. In order to compare the results with the well-known methodologies, they use simple micro accounting method and use distribution function (in the form of Beta distribution) as well. The results reveal that these three methodologies do not produce different results for poverty indicators in terms of the direction of changes and ranking of the households. A recent reweighting effort for Australia is provided by Tanton et al. (2014) which compares two different ways, combinatorial optimization and generalized regression method, and check their validity by using a census data. The recent examples of MSM/RA-CGE approach are as follows. Vidyattama et al. (2014) analyzes declining Australian terms of trade by linking spatial-microsimulation in order to obtain small area effects more accurately. de Quatrebarbes et al. (2016) provides and analysis of VAT reform of Niger in a static CGE framework and Cicowiez et al. (2016) serves an analysis of changing international terms of trade in Argentina.

Solving firstly RA-CGE module and feeding MSM by vectors of (commodity and factor) prices to obtain changes in the labor market outcomes, consumption and thus the income distribution seems to be restrictive since changes in these variables considered in MSM also

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[6] The original version is calibrated to a fictitious low income country. One version of this study with several extensions is calibrated to Turkey, (Agénor et al., 2006), without the micro-accounting exercise. Also, an incomplete version of it for Brazil, Agénor, Fernandes, et al. (2003), is available.

have effects on variables in the RA-CGE module. Thus, Savard (2003) solves these two modules sequentially, i.e. the results of two modules feed into each other until both of them reach a convergence simultaneously. The author concludes that he "thinks" the methodology produces richer information than other MSM/RA-CGE approaches despite its less tractable structure. The same procedure is followed by Aaberge et al. (2004) for Norway by simulating necessary tax adjustments to ensure fiscal sustainability in the presence of aging population and by Ferreira Filho and Horridge (2006) for Brazil in which the effects of trade integration on the income distribution are examined. Boccanfuso and Savard (2012) extends the original work via labor market segmentation in which labor supplies of households are estimated as discrete choice models. More recently, Cury et al. (2016) analyzes cash transfer policies and taxation in Brazil by also utilizing labor market segmentation with unemployment, the reservation wage is the major determinant of labor market participation.

## 3.2 Model Structure

The model economy is constructed as a small open economy in an intertemporal manner with heterogeneous household and firm structures. The model economy comprises seven representative households groups and 11 representative firms. Households and firms are modeled with distinguished characteristics to reflect the demand and supply structures of the Turkish economy. The model also includes the accounts of the government, the social security institution (SSI), and the rest of the world (RoW). The deficits of SSI are covered by the government who runs a budget deficit that is financed by foreign borrowing at world interest rate.

***A note on the terminology***

In the following chapters, the terms *firm* and *sector* are used interchangeably to define the production unit and subscript *s* stands for sector. For all variables related with firms/sectors, the upper-case letters are used. Moreover, for macroeconomic aggregates, such as gross domestic product, government revenues, trade balance, etc. upper-case letters are also used.

The terms *household* and *representative household group (RHG)* are used interchangeably and superscript *hh* stands for household / RHG. Household problem is solved at individual-level; each individual chooses per capita composite consumption and per capita composite

labor supply to maximize the individual utility by solving a utility maximization problem. In this problem, individual uses the parameters (wage tax rate, social security premium rate, etc.) that are obtained at RHG level in the calibration process. Multiplying optimal per capita variable by population of the RHG gives the RHG level optimal outcome. Therefore, all equations and variables in the section 3.2.1 are presented in per capita terms. Small-case letters are used for per capita variables while RHG level variables are denoted by upper-case letters.

### 3.2.1 Households

There are seven types of households; rural resident households ($RH$), skilled formal wage earners ($SF$), capitalists ($CH$), unskilled formal wage earners ($USF$), informal wage earners ($IW$), retirees ($RET$), and transfer receivers ($TRF$). Each household in the Household Budget Survey (HBS) is assigned into a unique group by applying several criteria such as area of residence (urban / rural), having a social security (working in a formal / informal job), level of education (threshold is having a high school degree) and employment status (being wage earner or casual worker / being employer or self-employed). The first five groups are chosen to reflect the labor market dynamics in Turkey. The latter two groups are emerged when households in HBS are analyzed. Details about household types and assignment process are provided in the section 4.1.

In order to introduce the major heterogeneity among the households, the set of households is mainly divided into two subsets; Ricardians (shortly *RIC* hereinafter) and non-Ricardians (shortly *NRIC* hereinafter). Households in the former subset, the first three of RHGs, are Ramsey type individuals[7] and maximize present discounted value of their lifetime utility and they have savings. On the contrary, households in the latter subset, the last four of RHGs, have no saving decision and they maximize their intratemporal utility. The basic reason of dividing the households into two subsets comes from the Household Budget Survey results in which *NRIC* household either have negative or negligible private savings. Galí et al. (2004) states that if the weight of non-Ricardian households is high, their increasing consumption

[7] This model, known as Ramsey-Cass-Koopmans, is considered to be superior to the Solow model since it allows the representative household to solve the saving decision endogenously.

would offset declining consumption of Ricardian households and thus prevent fall in aggregate demand and allow to economy to sustain output growth.

Each representative household's problem is solved in two stages. In the first stage, households choose per capita composite consumption ($tc_t^{hh}$) and per capita composite labor supply ($ls_t^{hh}$). This stage is different for *RIC*[8] than for *NRIC* households, obviously. The solution of the problem for households in the first subset has dynamic features while it is static for the latter subset. The second stage of the problem has two sub-stages. Firstly, each type of household allocates composite consumption among goods and services via Linear Expenditure System (LES). Secondly, each type of household (except retirees and transfer receivers only) decides to allocate per capita composite labor supply among different sectors in which it is assumed that each sector is an imperfect substitute for one another.

For the first stage problem of *RIC* households, the utility function is chosen as a constant relative risk aversion (CRRA) type. The risk aversion parameter is equal to inverse of the intertemporal elasticity of substitution (IES, $\theta$) which is constant[9]. The utility function of a typical *RIC* household is constructed as follows:

$$\max_{tc_t^{RIC},ls_t^{RIC}} \sum_{t=1}^{\infty} \left(\frac{1}{1+\rho}\right)^t \frac{\left[tc_t^{RIC}\ (1-ls_t^{RIC})^{\mu^{RIC}}\right]^{(1-\theta^{RIC})}}{1-\theta^{RIC}} \tag{3.1}$$

where $\mu$ shows the intensity of households preferences for leisure. Another basic feature of the utility function is that it comes in a multiplicatively separable form which has two outcomes. Firstly, it introduces the labor/leisure choice into the consumption Euler and makes these two decisions directly related in an intertemporal manner. Secondly, the intratemporal substitution between consumption and leisure is no longer a function of IES.

Ricardian households have linear budget constraints. In per capita terms, they get wage income and pay wage tax to the government (at rate $wagt^{RIC}$) and social security premium to the SSI (at rate $ssp^{RIC}$); get net-of-tax dividend income from the enterprises, receive unilat-

[8] The subjective discount parameter ($\rho$) is assumed to be uniform for each type of household.

[9] If the IES is a function of the level of consumption, it will be a time-varying parameter and it makes the model stochastic. Individuals with lower IES are more willing to postpone their consumption into the future but they avoid inequality between two periods' discounted utilities.

eral transfers form the government, $gtr_t^{RIC}$, and from the SSI[10], $str_t^{RIC}$. They allocate their disposable income between consumption and saving. Hence, the budget constraint of a *RIC* household in per capita terms is as follows:

$$PTC_t^{RIC}\, tc_t^{RIC} + s_t^{RIC} \leq w_t^{RIC}\, ls_t^{RIC}\,(1 - wagt^{RIC} - ssp^{RIC}) + cincshare^{RIC}\,\frac{DISDIV_t}{POP_t^{RIC}} + gtr_t^{RIC} + str_t^{RIC} \tag{3.2}$$

where $PTC_t^{RIC}$ is the price of composite consumption, $cincshare^{RIC}$ is the share of household *hh* in total value of distributed dividends, $DISDIV_t$, of enterprises.

The first order conditions for this maximization problem are as follows. Equation (3.3) is the well-known consumption Euler which shows the relation between two consecutive periods' composite consumption of the household. Equation (3.4) shows the intratemporal choice between per capita composite labor supply and composite consumption.

$$\frac{tc_{t+1}^{RIC}}{tc_t^{RIC}} = \left[\frac{PTC_t^{RIC}}{PTC_{t+1}^{RIC}}\,\frac{1+r_{t+1}}{1+\rho}\,\left(\frac{1-ls_{t+1}^{RIC}}{1-ls_t^{RIC}}\right)^{\mu^{RIC}(1-\theta^{RIC})}\right]^{\frac{1}{\theta^{RIC}}} \tag{3.3}$$

$$\frac{1-ls_t^{RIC}}{tc_t^{RIC}} = \frac{PTC_t^{RIC}\;\mu^{RIC}}{w_t^{RIC}(1-wagt^{RIC}-ssp^{RIC})} \tag{3.4}$$

Since RHS of the budget constraint is disposable income of a household, a typical Ricardian household's per capita savings can be written as

$$sav_t^{RIC} = inc_t^{RIC} - PTC_t^{RIC}\, tc_t^{RIC} \tag{3.5}$$

In the first stage problem of the representative *NRIC* household, intratemporal utility, which is assumed to be of Cobb-Douglas type, is maximized:

$$\max_{tc_t^{NRIC},ls_t^{NRIC}} \left(tc_t^{NRIC}\right)^{util}\,\left(1-ls_t^{NRIC}\right)^{1-util} \tag{3.6}$$

The budget constraint is also linear and simpler than that of the *RIC* household but it is also different for each household type within the group of *NRIC*. The group of *USF* receives all

[10] The transfers form the SSI may be in the form of pension and/or in the form of health benefits. Since these transfers are at household level, any member of the household can be a receiver of these transfers.

types of incomes except asset/capital income and pays wage income tax and social security premium from gross wage income. The group of $IW$ gets the wage income and unilateral transfers from the government. This group has no tax obligation and does not pay social security premium. The group $RET$ gets only retirement pension from the SSI. Lastly, the group $TRF$ gets only unilateral transfers from the government. The general form of budget constraint for the $NRIC$ households is presented in per capita terms as:

$$PTC_t^{NRIC}\, tc_t^{NRIC} \;\leq\; w_t^{NRIC}\, ls_t^{NRIC} \;+\; gtr_t^{NRIC} + \; str_t^{NRIC} \tag{3.7}$$

The FOC of this maximization problem, equation (3.8), shows the intratemporal substitution between per capita composite consumption and composite labor supply:

$$\frac{1-ls_t^{NRIC}}{tc_t^{NRIC}} = \frac{PTC_t^{NRIC}}{w_t^{NRIC}}\;\frac{1-util}{util} \tag{3.8}$$

As a first sub-stage of the second stage of the problem, all types of households disaggregate their composite consumption into commodities via LES. In this set-up, households first pay the bill of subsistence level of consumption and then use budget, i.e. discretionary expenditure, to determine the level of consumption by commodities. The subsistence consumption, $sc_s^{hh}$, is an exogenous parameter and is calibrated accordingly, income elasticity of consumption for each good $s$ for each household type $hh$[11]. In this stage, households are assumed to maximize their intra-period utility, which is assumed to be a Cobb-Douglas form, to choose the optimal level of consumption. Here, $cd_{s,t}^{hh}$ is per capita consumption of household $hh$ from commodity $s$, $MCLES_s^{hh}$ is the marginal budget share of commodity $s$ in discretionary expenditure of household $hh$ where $\sum_s MCLES_s^{hh} = 1$, and $PQ_{s,t}$ is price of commodity $s$ observed by households.

$$\max_{cd_{s,t}^{hh}} \prod_{s=1}^{S} (cd_{s,t}^{hh} - sc_s^{hh})^{MCLES_s^{hh}} \quad s.t \quad PTC_t^{hh}\, tc_t^{hh} \;=\; \sum_{s=1}^{S} PQ_{s,t}\; cd_{s,t}^{hh} \tag{3.9}$$

The solution, equation (3.10), determines the optimal level of consumption.

$$PQ_{s,t}\; (cd_{s,t}^{hh} \; - sc_s^{hh}) = MCLES_s^{hh} \left( PTC_t^{hh}\, tc_t^{hh} - \sum_{s=1}^{S} PQ_{s,t}\; sc_s^{hh} \right) \tag{3.10}$$

[11] The details about LES, the calibration process of subsistence level of consumption and the proof of household-specific price of composite consumption are provided in Appendix C.2.

The expression in parenthesis on the RHS of (3.10) is called as "discretionary expenditure". The second sub-stage of the second stage, households who supply labor allocate their composite labor supply among different sectors. Here, since it is assumed that each sector is an imperfect substitute for one another, each household solves the following problem in which they maximize their total wage income:

$$\max_{sls_{s,t}^{hh}} \; w_t^{hh}\, ls_t^{hh} \;=\; \sum_{s=1}^{S} sw_{s,t}^{hh}\, sls_{s,t}^{hh} \quad s.t \tag{3.11}$$

$$ls_t^{hh} \;=\; SLM^{hh} \left[\sum_s sslm_s^{hh} \left(sls_{s,t}^{hh}\right)^{-\rho_{slm}^{hh}}\right]^{-\frac{1}{\rho_{slm}^{hh}}} \tag{3.12}$$

where $w_t^{hh}$ is the composite wage rate of household type $hh$, $ls_t^{hh}$ is composite per capita labor supply, $sls_{s,t}^{hh}$ is per capita labor supply of household $hh$ in sector $s$ and $sw_{s,t}^{hh}$ is wage rate in sector $s$ for household type $hh$. Moreover, $sslm_s^{hh}$ is the share of sector $s$ in total labor supply of household $hh$, $\rho_{slm}^{hh}(= 1/\sigma_{slm}^{hh} - 1)$ is constant elasticity of substitution (CES) exponent parameter and $SLM^{hh}$ is CES shift parameter. The first order condition of this problem yields the per capita labor supply of type $hh$ in sector $s$;

$$sls_{s,t}^{hh} \;=\; \left[\frac{w_t^{hh}\, sslm_s^{hh}}{sw_{s,t}^{hh}\;\; (SLM^{hh})^{\rho_{slm}^{hh}}}\right]^{\sigma_{slm}^{hh}} ls_t^{hh} \tag{3.13}$$

Since there are five types of workers and eleven sectors, this labor market modeling could lead to have 55 labor market strata. However, public sector can hire neither self-employed / employer nor informal worker. Moreover, labor demand of the public sector in rural areas is set to be equal to zero due to the fact that the majority of public servants who serves in the rural areas are either skilled or unskilled who are appointed by the government. Thus, there are 52 strata. The reasoning of this modeling choice is explained in the section 4.2.4.

### 3.2.2 Firms

The production side of the model economy consists of 11 representative firms that corresponds to 11 different sectors which are assumed to produce only one product by using intermediate goods, capital and labor. These sectors are agriculture ($AGR$), mining, coal and petroleum ($MCP$), food, beverage and tobacco ($FBT$), textile ($TEX$), households non-durable goods

(*HNDG*), households durable goods (*HDG*), shelter (house & related activities) (*SHE*), construction (*CON*), transportation (*TRP*), public services (*PSER*), and other services (rest of the economy) (*OSER*). This sectors are constructed accordingly to ensure consistency between the production structure and the consumption structure which is derived from the HBS.

The production sector in the model economy shows heterogeneity w.r.t investment decision. A firm is considered to be either a member of a subset of "dividend maximizers", $DM = \{AGR, FBT, TEX, SHE, TRP, OSER\}$, or a member of a subset of "non-dividend maximizers", $NDM = \{MCP, HNDG, HDG, CON, PSER\}$. On the other hand, some commodities are not tradable and activities can also be classified as (non-)exporters/(non-) importers as well. Conventionally, firms maximize the current period's value added, i.e. the problem is static. In this structure, total investment is distributed among firms according to profit rate differentials, and, in most cases, these models are recursive dynamic models. If investment decision and thus the firm's problem is not constructed in an intertemporal manner, dynamics of a Ramsey type model entirely rely on consumption smoothing. However, non-static behavior of firms allows the model not only to make investments endogenous but also to introduce sectoral differences into firms' investment decisions.

Due to lack of statistical data on the sectoral composition of private sector foreign debt stock or borrowing, dividend maximizer sectors are assumed to finance their investment expenditures by using only their retained earnings[12]. A *DM* firm maximizes the value of the firm, $V_{DM,t}$, that is equal to the present discounted value of its dividends by choosing investment, $I_{DM,t}$, capital stock, $K_{DM,t}$, and composite labor, $CLD_{DM,t}$.

$$\underset{I_{DM,t}, K_{DM,t}, CLD_{DM,t}}{max} V_{DM,t} = \sum_{t=1}^{\infty} \left( \frac{1}{1+r_t} \right)^t DIV_{DM,t} \quad s.t \tag{3.14}$$

$$K_{DM,t+1} = (1-\delta_{DM}) K_{DM,t} + I_{DM,t} \tag{3.15}$$

where $\delta_{DM}$ is the depreciation rate. The Lagrange multiplier of this maximization problem

[12] Actually, especially for the last decade of the Turkish economy, this is a very strong assumption. By the help of huge global financial liquidity between 2003-7, appreciated TL makes foreign borrowing relatively cheaper than domestic borrowing for firms. Therefore, the composition of the economy-wide foreign debt stock has been changed in favor of private sector that also includes financial institutions. For discussions on the issue, among the others, see Aydın et al. (2006); Özmen and Yalçın (2007); Orman and Köksal (2015); Köksal and Orman (2015); Coşar (2016).

that is constrained by capital accumulation function is the well-known Tobin's q[13], i.e. the marginal value of capital:

$$DIV_{DM,t} = (1 - corptax)\, WK_{DM,t}\, K_{DM,t} - INV_{DM,t} \tag{3.16}$$

$$INV_{DM,t} = PI_t\, I_{DM,t} + PVA_{DM,t}\, ADJ_{DM,t} \tag{3.17}$$

$$ADJ_{DM,t} = \phi_{DM} \frac{I_{DM,t}^2}{K_{DM,t}} \tag{3.18}$$

Sectoral dividend is equal to net-of-corporate tax sectoral profit minus the cost of new investment equipments and adjustment cost. Adjustment cost is an increasing and convex function of investment; for a given level of sectoral capital stock, the cost of installing new capital equipments will be greater. Adjustment cost is measured by price of the value added, $PVA_{DM,t}$ (net-of-production tax producer price), because it is assumed that installation of new capital requires the resources of firm which leads to interruption of production process and thus losses of output. Sectoral profit is equal to deduction of total labor cost, including social security contribution paid by firm, from the sectoral value added.

$$WK_{DM,t}\, K_{DM,t} = PVA_{DM,t}\, VA_{DM,t} - CW_{DM,t}\, (1 + ssc_{DM})\, CLD_{DM,t} \tag{3.19}$$

The real value added, $VA_{DM,t}$, is assumed to be a CES aggregate of sectoral capital stock and sectoral composite labor:

$$VA_{DM,t} = AX_{DM}[share_{DM}^{va}\, K_{DM,t}^{-\rho_{DM}^{va}} + (1 - share_{DM}^{va})\, CLD_{DM,t}^{-\rho_{DM}^{va}}]^{-\frac{1}{\rho_{DM}^{va}}} \tag{3.20}$$

where $AX_{DM}$ is the CES shift parameter, $share_{DM}^{va}$ is the share of sectoral capital stock in sectoral value added, and $\rho_{DM}^{va} (= 1/\sigma_{DM}^{va} - 1)$ is the CES exponent parameter which is a function of elasticity of substitution parameter, $\sigma_{DM}^{va}$.

$$q_{DM,t} = PI_t + 2\, PVA_{DM,t}\, \frac{ADJ_{DM,t}}{I_{DM,t}} \tag{3.21}$$

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[13] Tobin's q is the ratio of the market value of existing capital to its replacement cost. See Hayashi (1982) for further discussion.

$$q_{DM,t}\,(1+r_t) \;=\; q_{DM,t+1}\,(1-\delta_{DM}) \;+\; PVA_{DM,t+1}\frac{ADJ_{DM,t+1}}{K_{DM,t+1}} + (1-corptax)\,WK_{DM,t+1} \tag{3.22}$$

$$CLD_{DM,t} \;=\; \left[\frac{(1-share^{va}_{DM})\,PVA_{DM,t}}{CW_{DM,t}\,(1+ssc_{DM})\,AX_{DM}^{\rho^{va}_{DM}}}\right]^{\sigma^{va}_{DM}} VA_{DM,t} \tag{3.23}$$

Equations (3.22), (3.21) and (3.23) are FOCs of the dividend maximization problem and they are associated with $q_{DM,t}$, $I_{DM,t}$ and $CLD_{DM,t}$, respectively:

Firms in the subset of *NDM* do not solve a dividend maximization problem, rather they maximize the value of current period's value added. Each of such firm's investment is a fixed share of current period's GDP and its capital stock evolves according to the following capital accumulation rule[14]:

$$INV_{NDM,t} \;=\; invshare_{NDM}\;GDP_t \tag{3.24}$$

$$K_{NDM,t+1} \;=\; (1-\delta_{NDM})\,K_{NDM,t} \;+\frac{INV_{NDM,t}}{PI_t} \tag{3.25}$$

where $INV_{NDM,t}/PI_t \;=\; I_{NDM,t}$, i.e. physical additions to the existing sectoral capital stock, since firms in the subset of *NDM* do not have an adjustment costs.

Once the level of sectoral investment and thus the level of sectoral capital stock are determined, the problem of a typical *NDM* firm shrinks to choosing composite labor:

$$\max_{CLD_{NDM,t}} \; PVA_{NDM,t}\,VA_{NDM,t} \;-\; WK_{NDM,t}\,K_{NDM,t} - CW_{NDM,t}\,(1+ssc_{NDM})\,CLD_{NDM,t} \tag{3.26}$$

$$VA_{NDM,t} \;= AX_{NDM}[share^{va}_{NDM}\;K_{NDM,t}^{-\rho^{va}_{NDM}} \;+(1-share^{va}_{NDM})\,CLD_{NDM,t}^{-\rho^{va}_{NDM}}]^{-\frac{1}{\rho^{va}_{NDM}}} \tag{3.27}$$

$$CLD_{NDM,t} \;=\; \left[\frac{(1-share^{va}_{NDM})\,PVA_{NDM,t}}{CW_{NDM,t}\,(1+ssc_{NDM})\,AX_{NDM}^{\rho^{va}_{NDM}}}\right]^{\sigma^{va}_{NDM}} VA_{NDM,t} \tag{3.28}$$

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[14] Firms in *NDM* sectors are not subject to calibration process for $\delta_{NDM}$, rather their sectoral depreciation rates are arbitrarily chosen.

Up to this point, each firm chooses its composite labor input, which is assumed to be CES aggregate of each type of labor, $LD^{hh}_{s,t}$. For each firm, disaggregation process, in which it tries to minimize its total labor cost, is uniform as follows:

$$\min_{LD^{hh}_{s,t}} CW_{s,t}\ CLD_{s,t} - \sum_{hh} sw^{hh}_{s,t}\ LD^{hh}_{s,t} \tag{3.29}$$

$$CLD_{s,t} \ = \ \left[\sum_{hh} labshare^{hh}_{s}\ \left(LD^{hh}_{s,t}\right)^{-\rho^{cl}_{s}}\right]^{-\frac{1}{\rho^{cl}_{s}}} \tag{3.30}$$

where $labshare^{hh}_{s}$ is the share of labor type $hh$ in the composite labor of sector $s$, $\rho^{cl}_{s}(= 1/\sigma^{cl}_{s} - 1)$ is CES exponent parameter which is a function of elasticity of substitution parameter, $\sigma^{cl}_{s}$, $sw^{hh}_{s,t}$ is wage per labor. The solution of this problem yields:

$$LD^{hh}_{s,t} \ = \ \left[\frac{CW_{s,t}\ labshare^{hh}_{s}}{sw^{hh}_{s,t}}\right]^{\sigma^{cl}_{s}} CLD_{s,t} \tag{3.31}$$

It is assumed that each firm has Leontief type production function, which means that intermediate goods and the real value added are complements. The level of sectoral real value added is equal to predetermined fraction, $vashare_{s} \in (0,1)$, of firm's gross production, $XS_{s,t}$. Once the level of real output is determined, the firm determines the level of the value added and intermediate input demands, $INT_{s\prime,s,t}$, which are predetermined fractions of total output, $iocoef_{s\prime,s} \in (0,1)$:

$$XS_{s,t} \ = min\left\{\frac{VA_{s,t}}{vashare_{s}}, \frac{INT_{1,s,t}}{iocoef_{1,s}}, \frac{INT_{2,s,t}}{iocoef_{2,s}}, \ldots, \frac{INT_{11,s,t}}{iocoef_{11,s}}\right\} \tag{3.32}$$

$$XS_{s,t} \ = \ \frac{VA_{s,t}}{vashare_{s}} \tag{3.33}$$

$$INT_{s\prime,s,t} \ = \ iocoef_{s\prime,s}\ XS_{s,t} \tag{3.34}$$

The $iocoef_{s\prime,s}$ are the "input-output coefficients". Naturally, $\sum_{s} iocoef_{s\prime,s} + vashare_{s} = 1$ has to hold. By definition, public services sector has no inter-sectoral relation with the rest of the economy, i.e. its products can't be used as intermediate inputs or it can't demand any intermediate input. Therefore, $iocoef_{s\prime,s} = 0\ \ \forall\ s\prime$, and $vashare_{s} = 1\ if\ s = PSER$.

### 3.2.3 Enterprises

The model economy includes an "enterprises" account. The representative enterprise is assumed to be the owner of all firms. Such assumption helps to simplify some details of the model and also abolishes the necessity of some figures which are almost impossible to obtain. The enterprises account collects all gross sectoral profits and receives transfers from the government, $GTRENT_t$, while pays corporate tax to the government, $CORPTAX_t$, and distributes the remaining income to households as dividend payments, $DISDIV_t$.

$$DISDIV_t = \sum_s WK_{s,t}\, K_{s,t} + GTRENT_t - CORPTAX_t \tag{3.35}$$

In the aftermath of the economic crisis in 2001, the foreign debt stock of the Turkish economy has almost tripled (as of the first quarter of 2016) and its composition has been changed remarkably. In the first quarter of 2002, 49.6% of total foreign debt stock was public sector's (excluding the Central Bank of Republic of Turkey) debt stock while 34.2% of it was private sector's debt stock. On the other hand, these shares are 29% and 71%, respectively, in 2016. Obviously, these phenomena would be incorporated into the model economy but there are no detailed statistics on the sectoral distribution of the foreign debt stock of the private sector, while it is available in distinction between financial and non-financial sectors. The total value of this debt stock and its accumulation would be incorporated into the enterprises account but since this does not affect the investment decision and thus capital accumulation of firms, it would not make contributions to the model dynamics[15].

### 3.2.4 Foreign Sector

Total domestic demand for each commodity is covered by domestic supply of domestically produced good, $QD_{s,t}$, and imports, $QM_{s,t}$, except $SHE, CON, PSER$. Here, total domestic supply of each commodity, $QS_{s,t}$, is an Armington composite of domestic supply and imports:

$$PQ_{s,t}\, QS_{s,t} = (PM_{s,t}\, QM_{s,t} + PD_{s,t}\, QD_{s,t})\,(1+vat_s) \tag{3.36}$$

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[15] This assumption is to be regarded as a heavy one since it is important for the analyses of structural transformation, middle income trap, premature deindustrialization, etc.

where $PM_{s,t}$ is the import price in terms of national currency, and $QM_{s,t}$ is the amount of imports. The price of this composite good, $PQ_{s,t}$, includes tariffs on international trade which is incorporated in $PM_{s,t}$ and also includes indirect taxes, namely value added tax at rate $vat_s$, collected from domestic trade.

$$QS_{s,t} = AX_s^{arm}\left[share_s^{arm} QD_{s,t}^{-\rho_s^{arm}} + (1 - share_s^{arm}) QM_{s,t}^{-\rho_s^{arm}}\right]^{\frac{-1}{\rho_s^{arm}}} \tag{3.37}$$

$$\frac{QM_{s,t}}{QD_{s,t}} = \left[\frac{1 - share_s^{arm}}{share_s^{arm}} \frac{PD_{s,t}}{PM_{s,t}}\right]^{\sigma_s^{arm}} \tag{3.38}$$

Total domestic supply of a non-imported commodity is equal to its domestic supply of domestically produced commodity, i.e. $QS_{s,t} = QD_{s,t}\ if\ s = \{SHE, CON, PSER\}$. Here, $\sigma_s^{arm}$ is the elasticity of substitution which is positive and obeys $\sigma_s^{cet} = 1/(1+\rho_s^{cet})$.

Firms, except $PSER$ and $SHE$, sell their goods either in domestic market or exports. Here, firms decide how much to export via profit maximization in which total output is a constant elasticity of transformation (CET) aggregate of domestic sales and exports:

$$PX_{s,t}\ XS_{s,t} \ = \ PE_{s,t}\ QE_{s,t} \ + \ PD_{s,t}\ QD_{s,t} \tag{3.39}$$

$$XS_{s,t} = AX_s^{cet}\left[share_s^{cet} QD_{s,t}^{\rho_s^{cet}} + (1 - share_s^{cet}) QE_{s,t}^{\rho_s^{cet}}\right]^{\frac{1}{\rho_s^{cet}}} \tag{3.40}$$

$$\frac{QE_{s,t}}{QD_{s,t}} = \left[\frac{1 - share_s^{cet}}{share_s^{cet}} \frac{PD_{s,t}}{PE_{s,t}}\right]^{\sigma_s^{cet}} \tag{3.41}$$

where $PE_{s,t}$ is the price of export in terms of national currency, $QE_{s,t}$ is the amount of exports, $PD_{s,t}$, and $QD_{s,t}$ are price and quantity of domestic supply of domestically produced commodity, respectively, while $\sigma_s^{cet}$ is the elasticity of transformation which is negative and obeys $\sigma_s^{cet} = 1/(1-\rho_s^{cet})$. For given levels of prices, equations (3.40) and (3.41) solve for $QD_{s,t}$ and $QE_{s,t}$, respectively. Non-exporter sectors do not solve such a maximization problem and their domestic supply is exactly equal to their production, i.e. $XS_{s,t} = QD_{s,t}\ if\ s = \{SHE, PSER\}$.

Equations (3.38) and (3.41) have the same functional form but they have different interpretations. In the former, prices and quantities are inversely related, while in the latter, since $\sigma_s^{cet} < 0$, prices and quantities are positively related. As price of export in terms of domestic currency increases, firms want to increase their export supply, while as import prices nomi-

nated in the domestic currency increases, consumers switch their demand to the domestically produced goods from the imported goods.

In CGE models without financial markets, nominal exchange rate is not a price but rather its simply a conversion factor of foreign prices into domestic prices. In such a model, only one of the following three can be solved endogenously; foreign trade balance, nominal exchange rate, and price index / real exchange rate (Robinson, 1989, 921). Here, nominal exchange rate is suppressed, i.e. assumed to equal to 1 and fixed, from the model and the price index (consumer price index) is fixed. Thus, the model solves foreign trade balance endogenously. Adelman and Robinson (1988) states that this strategy keeps the real exchange rate (the relative price of tradables and non-tradables) constant and the adjustment of the model ensured via quantity adjustment mechanism, i.e. the balance of trade.

$$TRBAL_t = \sum_s PWE_s \, QE_{s,t} - \sum_s PWM_s \, QM_{s,t} \tag{3.42}$$

### 3.2.5 Social Security Accounts

The SSI collects social security premium from employees from their gross wage income and social security contribution from activities from the gross wage cost:

$$SSP_t^{hh} = ssp^{hh} \, w_t^{hh} \, ls_t^{hh} \, POP_t^{hh} \tag{3.43}$$

$$SSCONT_{s,t} = ssc_s \, CW_{s,t} \, CLD_{s,t} \tag{3.44}$$

The SSI makes payments to households in terms of retiree pensions or health benefits which, as a sum, is considered to be a fixed fraction of current period's GDP. This total amount is distributed across households via fixed shares, $\gamma_s^{hh}$:

$$SSTRHH_t = sstrans \, GDP_t \tag{3.45}$$

$$str_t^{hh} = \frac{\gamma_s^{hh} \, SSTRHH_t}{POP_t^{hh}} \tag{3.46}$$

where $str_t^{hh}$ is per capita transfers receipt of household *hh* from the SSI.

The SSI runs a deficit which is covered by transfers from the government in each period:

$$SSDEF_t \;=\; SSTRHH_t \;-\sum_{hh} SSP_t^{hh} \;-\; \sum_{s} SSCONT_{s,t} \tag{3.47}$$

### 3.2.6 Government

In this model economy, the government collects wage tax from households from their gross wage income, production tax from activities from total value of production, value added tax from domestic trade and tariffs from imports, and corporate tax income from enterprises from sectoral profits.

$$TARIFS_{s,t} \;=\; tariff_s \; PWM_{s,t} \; QM_{s,t} \tag{3.48}$$

$$VATREV_{s,t} \;=\; vat_s \; (PM_{s,t} \; QM_{s,t} \;+\; PD_{s,t} \; QD_{s,t}) \tag{3.49}$$

$$PRODTAXS_{s,t} \;=\; prodtax_s \; PX_{s,t} \; XS_{s,t} \tag{3.50}$$

$$CORPTAXS_t \;=\; corptax_s \sum_{s} WK_{s,t} \; K_{s,t} \tag{3.51}$$

$$\begin{aligned} GOVREV_t \;=\; & \sum_{s} (TARIFS_{s,t} + VATREV_{s,t} + PRODTAXS_{s,t}) + \\ & \sum_{hh} wtax_t^{hh} POP_t^{hh} + CORPTAXS_t \end{aligned} \tag{3.52}$$

$$GOVCON_t \;=\; govcons \; GDP_t \tag{3.53}$$

$$GTRHH_t \;=\; transs \; GDP_t \tag{3.54}$$

The government devotes a fixed fraction of GDP to consumption, $GOVCON_t$, makes unilateral transfer payments to households, $GTRHH_t$, makes transfer payments to enterprises, $GTRENT_t$, and covers the SSI deficits, $SSDEF_t$. Government total expenditures can be written as

$$GOVEXP_t \;=\; GOVCON_t \;+\; GTRENT_t \;+\; GTRHH_t \;+\; SSDEF_t \tag{3.55}$$

As explained in detail in the next chapter, government transfers to enterprises figure is almost equal to sum of transfers/lending to enterprises and interest payments on the domestic debt stock. After the economic crisis in 2001, in line with the stand-by agreement with the International Monetary Fund (IMF), the government focused on the primary balance, i.e. gov-

ernment expenditures expect interest payments over outstanding (domestic and foreign) debt stock, to reduce public indebtedness and its negative consequences on domestic interest rate and inflation. In addition to this stabilization program, the global economy faced enormous increases in the global financial liquidity from 2003 until 2007-8. After the global financial crisis, the major central banks have started to apply the strategy of quantity easing to stimulate the economic growth and employment. Increasing foreign exchange inflows caused to appreciation in Turkish Lira, which resulted in increased imports and lowered domestic interest rate, which expanded private consumption expenditures. These two effects, which induced increases in tax collections of the government from both domestic and international trade, and aggressive privatization strategy of the government led to increases in revenues and primary balance objectives were reached. Thus, in this period, borrowing from the international markets, by the help of lower international interest rates, allowed the government to control domestic debt stock. Throughout the term, since the growth rate of the domestic debt stock is much lower than that of the foreign debt stock, its pressure on domestic interest rate and inflation have been abolished. On the other hand, due to records of the Undersecretary of Treasury, interest payments over domestic foreign debt stock is almost stable. Therefore, the value of government transfers to enterprises is assumed to be fixed.

The government can borrow from the international capital markets as much as needed at world interest rate, $r^*$. The interest payments of period $t$, $GFINT_t$, is equal to value of the foreign debt stock at the beginning of period $t$, $GFDS_t$, times $r^*$.

$$GFINT_t = r^* \, GFDS_t \tag{3.56}$$

Thus the foreign debt stock of the government evolves according to her intertemporal budget constraint.

$$GFDS_{t+1} = GFDS_t - GSAV_t \tag{3.57}$$

where

$$GSAV_t = GOVREV_t - GOVEXP_t - GFINT_t \tag{3.58}$$

If government savings increase in the period $t$, debt stock of the the period $t+1$ is lower than that of the period $t$. Most studies in the literature assume zero government savings which lead non-growing debt stock in the steady state. However, in this model economy, the foreign debt stock and thus interest payments of the government grow, since $GSAV_{ss} < 0$ which, in

turn, increases the foreign saving necessity of the economy. Total government consumption is allocated among commodities, $CG_{s,t}$, according to predetermined budget shares, $GLES_s$.

$$PQ_{s,t}\ CG_{s,t}\ =\ GLES_s\ GOVCON_t \tag{3.59}$$

$$gtr^{hh}\ =\ \frac{\gamma_g^{hh}\ GTRHH_t}{POP_t^{hh}} \tag{3.60}$$

Transfers payments to households are distributed among households by fixed shares, $\gamma_g^{hh}$, where $gtr^{hh}$ is per capita transfer receipt of household $hh$ from the government.

### 3.2.7 Aggregate Variables

Total investment demand of commodity $s$, i.e. investment by origin, is a fixed share of total investment demand of firms including adjustment cost, i.e. investment by destination. Due to lack of the official data, we do not know the sectoral capital composition matrix which shows the distribution of sectoral investment demand by commodities. Thus, calculation of investment by origin is sufficient.

$$PQ_{s,t}\ QINV_{s,t}\ =\ inv_s\ \sum_s INV_{s,t} \tag{3.61}$$

Total investment expenditures are either equal to sum of sectoral investment by destination or to sum of investment by origin

$$TOTINV_t\ =\ \sum_s PQ_{s,t}\ QINV_{s,t}\ =\ \sum_s INV_{s,t} \tag{3.62}$$

Total intermediate demand of a commodity $s$ is equal to sum of intermediate demands of sectors $s\prime$ to commodity $s$:

$$QINT_{s,t}\ =\ \sum_{s\prime} INT_{s\prime,s,t} \tag{3.63}$$

Total consumption demand of commodity $s$ is a sum of private consumption demands of households to commodity $s$.

$$TOTPRCON_{s,t}\ =\ \sum_{hh} cd_s^{hh}\ POP_t^{hh} \tag{3.64}$$

Total domestic demand of commodity $s$ is a sum of intermediate demand, investment demand, private consumption demand, and government demand.

$$QDD_{s,t} \;=\; QINV_{s,t} \;+\; QINT_{s,t} \;+\; TOTPRCON_{s,t} \;+\; CG_{s,t} \tag{3.65}$$

One can obtain the definition of GDP of current period by production approach as follows:

$$GDP_t = \sum_s (PVA_{s,t}\, VA_{s,t} \;+\; PRODTAXS_{s,t} \;+ VATREV_{s,t} + TARIFS_{s,t}) \tag{3.66}$$

### 3.2.8 Prices

The price of composite consumption is a function of final goods' prices but it is household-specific since $tc_t^{hh}$ is a household-specific composite of commodities.

$$PTC_t^{hh} \;=\; -frisch^{hh} \prod_{s=1}^{S} \left( \frac{PQ_{s,t}}{MCLES_s^{hh}} \right)^{MCLES_s^{hh}} \tag{3.67}$$

Price of value added, i.e. producers' price, is net of production tax, $prodtax_s$, and the cost of intermediate inputs in unit terms.

$$PVA_{s,t}\; vashare_s \;=\; (1 - prodtax_s)\; PX_{s,t} \;-\; \sum_{s\prime} PQ_{s,t}\; iocoef_{s\prime,s} \tag{3.68}$$

$PVA_{s,t} = PX_{s,t}$ since $vashare_s = 1$ and $prodtax_s = 0 \;\; for \;\; s = \{PSER\}$. Commodities are imported at world market prices, $PWM_s$, but domestic price of imported commodities includes tariff rate, $tariff_s$.

$$PM_{s,t} \;=\; PWM_s\; (1 + tariff_s)\; ER_t \tag{3.69}$$

Similarly, goods and services are exported at world market prices, $PWE_s$

$$PE_{s,t} \;=\; PWE_s\; ER_t \tag{3.70}$$

Price of sectoral output is determined by revenues acquired from exports and sales into domestic market.

$$PX_{s,t}\; XS_{s,t} \;=\; PE_{s,t}\; QE_{s,t} \;+\; PD_{s,t}\; QD_{s,t} \tag{3.71}$$

Price in each sector, that is a composite of import and domestic supply, is determined by total value of import and domestic sale and also includes value added tax collected from domestic trade:

$$PQ_{s,t}\; QS_{s,t} \;=\; (PM_{s,t}\; QM_{s,t} \;+\; PD_{s,t}\; QD_{s,t})\; (1 + vat_s) \tag{3.72}$$

Price of investment is a product of output prices where the exponent parameters are shares of commodities in total investment demand, from the equation (3.61):

$$PI_t \;=\; \prod_s PQ_{s,t}^{inv_s} \tag{3.73}$$

Equation (3.74) shows the material balance for each commodity $s$:

$$QDD_{s,t} \;=\; QS_{s,t} \tag{3.74}$$

By following the convention, equation (3.74) is associated with $PD_{s,t}$. Lastly, the price index, which is the numeraire of the system, is defined as

$$PINDEX_t \;=\; \sum_s PQ_{s,t}\; cons_{s,t} \tag{3.75}$$

where $cons_{s,t}$ is the weight of good $s$ in the consumers' basket;

$$cons_{s,t} \;=\; \frac{TOTPRCON_{s,t}}{\sum_s TOTPRCON_{s,t}} \tag{3.76}$$

### 3.2.9 Labor Market Equilibrium

Since each type of household has different characteristics, labor market is structured in such way that there are 52 labor market strata in the model. As mentioned above, there are five types of workers ($CH$, $RH$, $SF$, $USF$, and $IW$) who supply their labor to eleven sectors. Therefore, there would be 55 labor market strata but there are 52 of them due to following three reasons: a(n) self-employed / employer can not work in the public sector, the public sector do not employ any person as an informal worker, and the public employment in rural areas is assumed to be zero.

$$LD_{s,t}^{hh} \;=\; sls_{s,t}^{hh}\; POP_t^{hh} \tag{3.77}$$

In each labor market stratum, supply and demand of each type in each sector is equated and the sectoral wage by household type, i.e. $sw_{s,t}^{hh}$, is determined. On the other hand, the composite wage rate for each type of household is calculated so as to ensure that the objective function of the second sub-stage of the second stage problem of households holds:

$$w_t^{hh}\ ls_t^{hh}\ =\ \sum_s sw_t^{hh}\ sls_t^{hh} \tag{3.78}$$

where $w_t^{hh}(ls_t^{hh})$ is per capita composite wage rate (composite labor supply) of household $hh$ and $sw_t^{hh}(sls_t^{hh})$ is per capita sectoral wage rate (sectoral labor supply) of household $hh$.

$$LSUP_t^{hh}\ =\ \sum_s sls_{s,t}^{hh}\ POP_t^{hh} \tag{3.79}$$

Equation (3.79) solves total labor supply of each household type.

### 3.2.10 Saving-Investment Equilibrium

Total savings has three components; private savings of households, government savings, and savings from the rest of the world, i.e. foreign savings. The sum of these components has to be equal to total investment that is either sum of market values of investment demands of each goods (investments by origin) or sum of sectoral investment expenditures including adjustment costs, (investments by destination). Total private saving is equal to the sum of per capita savings of *RIC* households multiplied by the respective population sizes:

$$TOTPRSAV_t\ =\ \sum_{RIC} s_t^{RIC}\ POP_t^{RIC} \tag{3.80}$$

The equilibrium in the rest of the world account requires holding

$$\sum_s PWE_s\ QE_{s,t}\ + FSAV_t\ =\ \sum_s PWM_s\ QM_{s,t} + \ GFINT_t \tag{3.81}$$

If financial markets exist in the model, the nominal exchange rate, $ER_t$, can be associated with equation (3.81) in which the LHS is the total foreign exchange inflows while its RHS is the total foreign exchange outflows. As mentioned in the section 3.2.4, the model solves trade balance endogenously. Thus, by using equation (3.42), equation (3.81) can be written as

$$TRBAL_t\ =\ GFINT_t\ -\ FSAV_t \tag{3.82}$$

$$TOTPRSAV_t\ +\ FSAV_t\ ER_t\ + GSAV_t\ =\ TOTINV_t \tag{3.83}$$

The LHS of (3.83), saving-investment equilibrium, is total supply of loanable funds while the RHS is total demand to funds. It is evident from the government's intertemporal budget constraint, equation (3.57), that if there exist an increase in the difference between government expenditures and revenues, government savings is reduced and she has to borrow, i.e. $GFDS_{t+1} - GFDS_t > 0$, to hold the constraint. Since it is assumed that she can borrow from the international markets at the world interest rate, it increases the foreign exchange necessity of the economy. Thus, as the government foreign debt stock increases, foreign savings also increase. Moreover, increasing difference between total investment and private savings, i.e. saving-investment gap, also requires a higher level of foreign exchange inflow[16].

### 3.2.11 Steady State Conditions

The Ramsey-Cass-Koopmans model assumes that households are alive for infinite periods. Thus, the problem of them is solved theoretically for an infinite horizon but obtaining numerical solutions is needed to solve this problem for a finite horizon. In this study, the horizon is chosen as 100 periods. This period is chosen so as to be sufficient to obtain a convergence in the key variables.

Here, $100^{th}$ period is called as the "terminal period" which is the end of the economic life. Therefore, none of the agents should left an exhaustible resource at the end of the terminal period. Theoretically, obtaining a unique solution for a difference equation (such as the capital accumulation function, equation (3.15)) is needed to specify two boundary conditions. One of them is the initial level of corresponding variable such as the sectoral capital stock, $K_{s,0}$. Using all resources in the terminal period emerges the second boundary condition such that $K_{s,T+1} = 0$. This is not surprising because if economic life ends at the end of a period, there is no reason for a firm to have a positive capital stock following the terminal period. The conditions for a terminal period are called as "transversality conditions" which are imposed to characterize the optimal path of dynamic variables. Therefore, terminal conditions imposed to reach a steady state are equivalently the steady state conditions.

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[16] From Appendix C.3, it is clear that equations (3.81) and (3.83) are interdependent to each other and one of them has to be dropped. Thus, for given foreign trade balance, from equation (3.42), equation (3.82) is associated with foreign savings and equation (3.83) is commanded out.

In the steady state, since the level of sectoral capital stock is constant, $K_{s,t} = K_{s,t+1} = K_s^{ss}$, then capital accumulation function implies that each sectors' investment is just sufficient to cover sectoral depreciation.

$$I_s^{ss} \;=\; \delta_s K_s^{ss} \tag{3.84}$$

In the steady state, a sector's dividend is equal to the risk-free asset's yield. This means that each sectors' dividend is equal to the value of the firm times interest rate;

$$DIV_s^{ss} \;=\; r^{ss}\, V_s^{ss} \;=\; r^{ss}\, q_s^{ss}\, K_s^{ss} \tag{3.85}$$

The third and the last terminal condition is about the government foreign debt stock. When the steady state is reached, the foreign debt stock of the government has to remain constant, i.e. $GFDS_{T+1} = GFDS_T$ where $T$ is the end of horizon. From the intertemporal budget constraint of the government at the end of the horizon,

$$GFDS_{T+1} = GFDS_T - GSAV_T \tag{3.57}$$

it is evident that the government's savings has to be equal to zero, i.e. $GSAV_T = 0$. In other words, total value of expenditures and interest payments over the foreign debt stock have to be equal to total revenues.

$$GOVREV_T \;=\; GOVEXP_T \;+\; GFINT_T \tag{3.86}$$

Since terminal conditions are equivalent to steady state conditions, the third condition can be written as $GSAV_{ss} = 0$.

### 3.2.12 Extending the Model: Internal Migration

For the Turkish economy, internal migration from rural areas to urban areas or from less developed provinces to developed provinces is a phenomenon. According to the results of Bülbül and Köse (2010), the Northeast Anatolia, the Southeast Anatolia, and the Blacksea regions are consistently emigrants regions while İstanbul, the Mediterranean region, the Marmara region, and the East Anatolia region are stable immigrant-receiving regions. TGYONA (2006), which is the most comprehensive study on internal migration in Turkey, states that the major reasons of migration are marriage, education, job change, appointment, family issues, etc.

Migration flows change not only the demographic structure but also wage rates, total private savings, total private consumption and its distribution among commodities, etc. Therefore, this demographic transformation affects the income distribution even if there is no other change in the internal and external circumstances. Since it is a phenomenon in Turkey, the model economy described above is extended to incorporate migration. This section is devoted to explain the details.

In the migration literature, Harris-Todaro approach, based on Harris and Todaro (1970), is extensively used. In this approach, the authors assume that there is only one sector in each area of residence; sector in urban (rural) area is modern (traditional) sector and minimum wage legislation is binding in urban areas. Differences between the wage rates in these two sectors, due to productivity differentials, engenders the migration from rural to urban areas. Therefore, migration is modeled as a function of difference between urban "expected" wage and rural wage and it is also restricted by urban involuntary unemployment.

This methodology is also used by a couple of CGE studies for the Turkish case. de Santis (2003) postulates the effects of Turkey's accession to the Customs Union by utilizing traditional Harris-Todaro approach and wage curve approach to abolish the original view's fixed urban wage assumption. Yeldan et al. (2012) analyzes the relationship between employment and growth by special emphasize on the regional income disparities by utilizing a regional recursive dynamic model and Yeldan et al. (2013) discusses policy alternatives for Turkish economy to break the middle income trap.

However, this approach is criticized since it assumes that immigrants who can not find a job in urban modern sector will be unemployed. On the other hand, Cole and Sanders (1985) argues that Harris-Todaro approach, even it can explain the migration phenomenon well, lacks explanation on the fact that why individuals still migrate while there is a huge unemployment in the urban areas. Therefore, they extend Harris-Todaro approach by dividing urban sector into formal and informal (they call it as "subsistence") sectors. In their approach, therefore, urban "expected" wage is weighted average of wage rates in urban formal and urban informal sectors. In this study, Cole-Sanders approach is used with some different features due to indigenous characteristics of the model economy describe above.

In the migration literature that uses CGE approach, per capita labor supply is assumed to be

perfectly inelastic. In other words, there is no labor-leisure decision. Calvo (1975), Fields (2005), Genç İleri (2015) are some examples of this modeling strategy. Genç İleri (2015), the analysis of immigration policy of Canada on natives' college attendance and welfare, explains the reasoning by referring the results of Heckman et al. (1998); "intertemporal elasticity of labor supply is too low". For the Turkish economy, a recent study of Ünveren and Sunal (2015) finds that this elasticity varies between 0.27 and 1.39, due to the choice of instrumental variable used in GMM estimations. Since the authors constructs a CGE model for single household - multiple sectors, their results can not be generalized for the Turkish economy. Therefore this study, to our best knowledge, will be the first attempt to analyze the migration phenomenon in the existence of labor-leisure choice.

Existence of labor-leisure choice not only affects migration function that determines the number of immigrants but also convergence of migration to its steady state level. As migration occurs, labor supply (wage rate) in urban areas will be higher (lower) which invokes individuals to increase their labor supply to compensate the decline in their wage income. On the contrary, migration leads to decrease (increase) in labor supply (wage rate) in rural areas which, in turn, leads to decrease in labor supply. Endogeneity of labor supply dumps the convergence between urban "expected" wage income and rural wage income and thus migration declines slowly.

Another indigenous characteristic of the migration modeling is the absence of involuntary unemployment in urban areas. Hoopengardner (1974) defines the original Harris-Todaro framework as a ***stable dynamic disequilibrium*** in which the employment rate will remain constant. The author's strategy, which is also utilized in this dissertation, is solving all wages endogenously which allows the wage rates in the urban labor markets to adjust freely to aspire the migration inflows.

It is assumed that an immigrant works either as a unskilled formal wage earner, i.e. $USF$, with probability $\alpha$ or as a informal wage earner, i.e. $IW$ with probability $(1-\alpha)$. The migration function looks like

$$MIG_t = \left[\frac{\alpha\ rnw_t^{USF} + (1-\alpha)\ rnw_t^{IW} - rnw_t^{RH}}{rnw_t^{RH}}\right]^{migres} LSUP_{t-1}^{RH} \tag{3.87}$$

$$rnw_t^{hh} \;=\; \frac{w_t^{hh}\,(1-wagt^{hh}-ssp^{hh})}{PTC_t^{hh}} \tag{3.88}$$

where $rnw_t^{hh}$ is real net wage of household $hh$, $migres$ is migration elasticity parameter, and $LSUP_{t-1}^{RH}$ is the remaining total labor supply in rural areas[17]. Real net wage, $rnw_t^{hh}$, is calculated as dividing wage tax and social security premium net of composite per capita wage rate by household-specific price of composite consumption. It is evident that, migration declines as net wage differential and labor supply in rural area shrinks. Migration function is chosen in a nonlinear form in order to achieve smooth pattern for migration. By choosing a linear form of migration function, the algorithm also achieves an optimal solution but the volatility in some variables, especially sectoral ones, is relatively bigger. However, to obtain gradual decline in the level of migration, this function has to be convex and $migres > 1$ has to hold.

Migration phenomenon directly affects three households ($RH$, $USF$, and $IW$) with different major characteristics such as having saving decision, sources of incomes etc. Populations of households affected by migration are no longer be constant but evolve as

$$POP_{t+1}^{USF} \;=\; POP_t^{USF} \;+\; \alpha\, MIG_t \tag{3.89}$$

$$POP_{t+1}^{IW} \;=\; POP_t^{IW} \;+\; (1-\alpha)\, MIG_t \tag{3.90}$$

$$POP_{t+1}^{RH} \;=\; POP_t^{RH} \;-\; MIG_t \tag{3.91}$$

The other four RHGs' ($CH$, $SF$, $RET$, and $TRF$) populations are constant along the base-path and along all the experiment paths.

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[17] *"Todaro's original strategy was using urban labor force but it is difficult to see economic and behavioral meaning of this strategy"* (Bartlett, 1983, 86).

# CHAPTER 4

# DATA AND CALIBRATION

This chapter aims to present the dataset constructed to depict the steady state equilibrium and details of the calibration process of the model economy to this equilibrium. The calibration process is the calculation of necessary parameter values and it can be conducted by econometric approaches. However, constructing a Social Accounting Matrix allows a researcher to describe an (accounting) equilibrium of the economy and to calculate parameter values in a more consistent manner.

In the following sections, assignment process of households in the HBS into unique RHGs is explained. Then, construction of SAM by referring each agent's accounts and calibration process of model parameters are clarified in detail and lastly, SAM is provided.

## 4.1 Assigning Households into RHGs

One of the major aims of this study is to utilize household-level data sets extensively in the calibration process. In this respect, distribution of population, shares of different income components in total household income, budget shares of commodities in households' total consumption, income elasticity of consumption for each commodity for each household, and some other parameters are calibrated from the Household Budget Survey (HBS).

In line with the base year choice, HBS-2011 is used to obtain household parameters. A routine is constructed to assign each household in HBS-2011 into a unique RHG and then compositions of income and consumption expenditures are obtained for each type of RHG. However, since income elasticity of consumption for each commodity is needed to calibrate

subsistence level of consumption of each commodity for each RHG, HBS-2002 is also utilized by applying the same routine.

For each year's HBS, TURKSTAT provides three different files. The first file constitutes household level data such as area of residence, property ownerships (car, house, land), stuffs in the house (furniture, refrigerator, washing machines etc.), household type (nuclear or extended family), total disposable income including imputed rents, total household consumption, etc. The second file comprises individual level data that such as age, sex, proximity to head of household, educational attainment, marital status, working status, weekly hours of work, total cash and total in-kind income, transfers from the government or other sources, incomes from asset ownership, etc. The third file contains the composition of consumption expenditures, at household level, according to the Classification of Individual Consumption by Purpose (COICOP) which is constructed by the United Nations. This classification has 14 major[1] (2-digits) and 198 minor (5-digits) items. Households consumption expenditures are aggregated into 10 commodities, since output of public services can not be demanded for private consumption purposes.

Each household (9,918 in total) in HBS-2011 is assigned to a unique RHG in several steps. If the head of household has an employment record in the survey year or if the head of household has no employment record but if only one member of the household has an employment record in the survey year, these individuals are chosen to represent the household. If more than one non-head member of household have an employment record in the survey year, then one of these individuals is selected firstly according to his/her experience (number of years worked). If there are still more than one individual, then a person who spent most of the year (number of worked months information is available) as employed is chosen. If there are still more than one individuals, then the older one is chosen. Once one member from each household is chosen, then households are assigned into RHGs uniquely according to household level (area of residence) and individual level (level of education, working status, and having a social security) characteristics of the chosen member.

Initially, five RHGs (capitalists, rural residents, skilled formal wage earners, unskilled formal

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[1] As a standard household survey, HBS does not provide information about consumption expenditures of non-profit institutions and general government. So, there are 12 major items.

wage earners, and informal wage earners) are planned to be constructed. However, 7.5% of households can not be assigned into these five RHGs since their only source of income is either unilateral transfers from the government and/or retiree pensions and they have negative savings. Therefore, two more RHGs (retirees and transfer receivers) are defined and the remaining households are assigned into one of them, in spite of their small share in total population and total number of households. Since these households survive solely by public funds, their welfare and living standards are purely determined by the fiscal policy. Therefore, any change in the framework of the fiscal policy directly affects these households' standards of living and thus the income distribution.

- Households in which at least one member works as a self-employed/employer or households in which no one has an employment record in the survey year but gets a positive asset income are assigned to the group of capitalists, $CH$. This group constitutes 15.4% (14.5%) of total number of households (population).
- All of the population living in the rural areas are assigned to the group of rural residents, $RH$, and it constitutes 30.7% and 31.5% of total number of households and population, respectively. Being an unpaid family worker is a common phenomenon especially in rural areas (32% of total rural employment) and these households are also included in $RH$.
- The group of skilled formal wage earners, $SF$, consists of households in which at least one member of the household works formally (i.e. a job with a social security) as a wage earner/casual worker who has at least 2-year college degree. This group constitutes 10% and 9.2% of total number of households and population, respectively.
- Households in which at least one member of the household works formally (i.e. a job with a social security) as a wage earner/casual worker with a high school degree, at most, are assigned to the group of unskilled formal wage earners, $USF$. This group constitutes 24.7% and 27.3% of total number of households and population, respectively.
- The group of informal wage earners, $IW$, consists of households in which at least one member works informally as a wage earner/casual worker and households. Moreover, urban resident unpaid family workers are included in this group. It constitutes 11.6% (13.5%) of total number of households (population).

- The group of retirees, $RET$, includes households in which no one has an employment record in the survey year and the only source of household income is retirement pension from the social security institution (SSI), i.e. they do not receive any unilateral transfers from the government, wage or asset income. The group constitutes 3.9% of total number of households and 2.0% of total population.
- Lastly, households in which no one has an employment record in the survey year and household income is equal to sum of transfers from both the government and from the social security institution, i.e. they do not receive wage or asset income, are assigned into the group of transfer receivers, $TRF$. The group constitutes 3.6% of total number of households and 1.9% of total population.

Since the original HBS results show that Ricardian households' total share in total private savings is 99.5%, incorporating saving decisions for the remaining RHGs would be irrelevant. Private savings of these non-Ricardian households are added to *SF*'s private savings.

## 4.2 Social Accounting Matrix

A SAM is a square matrix which constitutes a row and a column for each agent described in the model economy. Rows of the matrix show the components of income (wage income, asset income, transfer receipts, tax receipts, receipts from the rest of the world, etc.) while columns show the composition of expenditures (consumption demand, investment demand, intermediate input demand, tax payments, payments to the rest of the world, etc.) of the corresponding agent. By definition, an agent's total income and total expenditures have to be equal to each other. A typical SAM shows the relationships between the agents in the model economy and since each agent's account is in equilibrium, SAM also provides a snapshot of macroeconomic environment in equilibrium. A base year, for which SAM is constructed, has to be chosen a year in which prices are stable. Since 2008/09 are the years of global financial crisis and 2010 is the year of adjustment, prices are more stable in 2011. Thus, it is chosen as a base year. A typical SAM has major components such as activities, commodities, the government, and the rest of the world. Firstly, aggregation process of sectors and details on updating of figures is explained and the following subsections explain the calibration process of parameters step by step.

### 4.2.1 Aggregation and Update

The national accounts are basic sources of aggregate data such as gross domestic product, tax collections from trade, foreign savings, etc. that are required to obtain parameter values and conduct numerical analyses. However, obtaining inter-sectoral flows to show the sectoral relations requires detailed input-output table but its latest official version for Turkish economy is available for 2002. However, since 2011 is chosen as a base year, inter-sectoral flows, cost of production, demand components, etc. have to be retrieved for 2011 and all of these have to be consistent with the national accounts. Obviously, the structure of production has been changed remarkably throughout the period and representative power of the information provided for 2002 may be criticized but utilizing it is inevitable. Thus, by following Erten (2009), 59 different sectors available in 2002 input-output table are aggregated into 11 sectors[2]. As a reminder, definitions of the sectors are as follows: agriculture $(AGR)$, mining, coal and petroleum $(MCP)$, food, beverage and tobacco $(FBT)$, textile $(TEX)$, households non-durable goods $(HNDG)$, households durable goods $(HDG)$, shelter (house&related activities) $(SHE)$, construction $(CON)$, transportation $(TRP)$, public services $(PSER)$, and other services (the rest of the economy) $(OSER)$.

After completing the aggregation process, price system of input-output table has to be converted. There are three price systems; market prices, producer prices, and basic prices. Subtracting trade and transportation margins from market prices ends up with producer prices. From producer prices, subtracting taxes and adding subsidies, i.e. subtracting net taxes, on commodities yields basic prices. Since trade and transportation margins and taxes on commodities can differ within a country, basic prices are the most homogeneous price system and thus input-output tables are prepared by using them. However, constructing a SAM needs conversion of basic prices to producer prices. To do this, net tax matrix provided by TURKSTAT is aggregated in line with the aggregation made in input-output table and these net taxes are added to corresponding accounts in the final demand block, i.e. net taxes are added to private consumption, government consumption, investment, changes in inventories and exports.

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[2] The sectors are classified by NACE Rev.1 at 2-digit level. The aggregation key is provided in the Appendix D. Major aim of using such an aggregation key is obtaining a production side that is consistent with composition of household consumption that is available in HBSs.

On this aggregated and price-adjusted input output table, a couple of adjustment have to be applied to the public services accounts since, by definition, the product of this activity can not be used as an intermediate input. Thus, figures on inter-sectoral flows that appear in the *PSER* row have to be equal to zero. Moreover, since public services can not be demanded for final usage, figures on demand by consumption and investment purposes that appears in the *PSER* row, except government demand, also have to be equal to zero. These figures are added to the account of other services, *OSER*, which is used as a residual account for all adjustments. A couple of adjustments are also carried out for the column, i.e. expenditures, of *PSER* account. Since public services do not use commodities as an intermediate input, figures on inter-sectoral flows that appear in *PSER* column have to be equal to zero. In addition, since public goods provision activities are exempted from production taxes and also subsidies, net indirect tax payments to the government has to be equal to zero. Lastly, since these activities are not profit-seeking activities, their value added is equal to compensation of employees and fixed capital consumption, i.e. depreciation. All these figures are cleared in the *PSER* column and added to the accounts of *OSER*.

By using input-output table, several proportions are calculated by assuming that the shares of activities in total value added and the shares of intermediate inputs in total production are constant. This means that sectoral composition of total value added and more importantly the production technologies have not changed. By using these proportions, aggregate values of 2011 such as gross domestic product, tax collections from trade, total exports, total imports, total private consumption, etc. are calculated for each sector and commodity. On the demand side, the distribution of private consumption, government consumption, and investment demand across sectors are assumed to be unchanged but the sectoral shares in total imports and exports are calculated from official export and import data provided by TURKSTAT, according to ISIC (International Standard Industry Classification) Rev. 3. After this updating, some of the figures are calculated residually in SAM balancing.

### 4.2.2 Activities and Commodities

Activities account shows the production structure of the economy. Columns of these account can be divided into two parts, input-output block and value added block. This first block is

a square matrix and shows which sectors use which sectors' output as an intermediate input. Since intermediate input demand is a demand on a commodity, these figures are in commodity rows of activity columns. The latter block constitutes data on sectoral payments to factors of production (capital/labor/land rows), shows relations with the government (subsidies and taxes on production, government row), and relations with the social security institution (SSI row). The sum of these figures in the second block is sectoral value added. On the other hand, rows of activities show income sources of these production units. Firms supply their products either to the domestic market or exports. For a given level of sectoral export, domestic supply of each commodity is calculated as a residual and this figure is in the cells correspond to activity row / commodity column of each commodity. By definition, column and row sums of each activity have to be equal to each other.

The commodity rows show sources of demand for commodities; intermediate input demand, $INT_{s',s}$ that is interpreted as "intermediate demand of sector $s$ from commodity $s'$", private consumption (households' columns, $TOTPRCON_s$), the government demand (government column, $CG_s$), and finally investment demand (investment column, $QINV_s$). The commodity columns show total supply which come from domestic supply of domestically produced goods $(QD_s)$ and imports $(QM_s)$. The rest of the world row of these columns show the value of imports by commodities. Since government collects taxes from domestic trade (value added tax, $VATREV_s$) and from international trade (tariffs, $TARIFS_s$), the market value of supply includes these two taxes and total value of these two taxes appear on government row / commodity column. By definition, column and row sums of each commodity have to be equal to each other; total supply of a commodity is equal to its demand.

The input-output table that is obtained after aggregation and necessary adjustments (*the updated I/O table* hereinafter) is used to calculate each activity's share in total value added. The value of gross domestic product $(GDP)$ is retrieved from the national accounts and it is equal to sum of compensation to employees, gross operating surplus and production taxes and taxes on commodities. Thus, tax collections from trade (both domestic and international) are retrieved from the government accounts and are subtracted from GDP firstly to obtain sum of sectoral value added and then the share parameters are used to calculate sectoral value added, $VA_s$. The share of value added in total production for each activity is calculated from the updated I/O table and is used to calculate sectoral production, $XS_s$.

The input-output coefficients ($iocoef_{s\prime,s}$) are calibrated by dividing intermediate input demand of sector $s$ from sector $s\prime$, i.e. $INT_{s\prime,s}$, to total value of production. Notice that subtracting total of these parameters for each activity from 1 yields the share of sectoral value added in sectoral production ($vashare_s$) since the production function is assumed to be in a Leontief form. Since taxes on production can not be retrieved form the government accounts, composition of total tax collection as of taxes on commodities and taxes on production are obtained from the updated I/O table and firstly sectoral production tax payments ($PRODTAXS_s$) are calculated and then production tax rates ($prodtax_s$), by dividing production tax payments to sectoral output, are calibrated. Since price of sectoral value added ($PVA_s$) is production tax net of output price, which is equal to 1, the price of value added is calculated by using eq. (3.68).

The shares of compensation of employees ($CW_s\ (1+ssc_s)\ CLD_s$) for each activity is calculated by dividing wage payments by sectoral gross value added. Subtracting total intermediate cost, production taxes and compensation of employees from total production for each activity yields sectoral gross operating surplus ($WK_s\ K_s$, i.e. gross payments to capital) which has two components; net operating surplus and depreciation. Shares of these components are calculated by dividing them by gross operating surplus, assuming that each activity/firm devotes a fixed fraction of its gross profit for depreciation payments.

As mentioned above, only compositions of exports and imports across sectors have changed by using the sectoral exports and import shares in 2011. Once sectoral exports, $QE_s$, are calculated, domestic supply of domestically produced goods ($QD_s$) are calculated by subtracting these exports from total sectoral output and they are written activity row / commodity column.

Total private consumption, total government demand, and total investment demand (including changes in inventories) are retrieved from the national accounts and they are distributed among sectors by using the share parameters from the updated I/O table. By adding intersectoral flows to this final demand components, row sum of commodity account, i.e. total demand of each commodity, is calculated. Total tax collection from commodities is decomposed into value added tax ($VATREV_s$) and tariffs ($TARIFS_s$), after which value added tax rates ($vat_s$) and tariff rates ($tariffs_s$) are calibrated. Sum of commodity column yields total domestic supply of each commodity ($QS_s$)[3].

[3] Obviously, total demand for each commodity does not necessarily be equal to supply of it. Thus, residuals

Each activity pays social security contribution to the social security institution from their compensation of employees. From the aggregate figures, social security contribution payments of each activity ($SSCONT_s$) is calculated and then social security contribution rates are calibrated by dividing ($SSCONT_s$) to net labor cost, i.e. compensation of employees minus social security contribution payment. The following table provides parameter values mentioned above.

### 4.2.3 Government and the Social Security Institution

The general government in Turkey has three major subsets; the central government, the local governments, and the social security institution, (SSI). In this study, the former two of them are treated as *the government* and the SSI is separated. Data on these two agents are compiled from the General Directorate of Public Accounts (GDPA) which is a sub-unit of The Ministry of Finance. The government's and the SSI's income and expenditure items are aggregated into following items to be used in the SAM: Value added tax and tariff revenues of the government

**Table 4.1: Accounts of the Government and the SSI**

| | | Government | SSI |
|---|---|---|---|
| **Income** | **Income Tax** | 69 378 | |
| | **Corporate Tax** | 93 078 | |
| | **Value Added Tax** | 111 021 | |
| | **Tariffs** | 53 452 | |
| | **Premiums** | | 114 032 |
| | **Total** | 326 928 | 114 032 |
| **Expenditure** | **Consumption** | 180 708 | |
| | **Transfers to Enterprises** | 57 624 | |
| | **Transfers to Households** | 53 291 | 136 827 |
| | **Transfers to SSI** | 22 796 | |
| | **Foreign Interest Payments** | 15 034 | |
| | **Total** | 329 453 | 136 827 |

***Source:*** Author's calculations from government accounts compiled from the General Directorate of Public Accounts (GDPA), the Ministry of Finance for the year 2011. The figures are in billion TL.

are directly compiled from the GDPA. Other incomes of the government (property taxes, interest income, fees etc.) are distributed among income tax and corporate tax revenues.

(column total of each commodities minus row total) are calculated. The adjustment of these residuals are done differently for each commodity. For sectors $AGR, MCP, FBT, TEX$ and $HNDG$, residuals are added to private consumption; while for sectors $HDG, SHE, CON$ and $TRP$, residuals are added to investment demand. For public services, $PSER$, residuals are added to government consumption demand. To hold for column sums for each demand component, corresponding adjustments are done in the accounts of other services, $OSER$.

Premium revenues of the SSI that includes social security premiums, general health insurance premiums, work accident premiums, and interest income and fees are also compiled from the GDPA but these figures do not include "state subsidy" which constitutes social security support premiums and state support for health premiums. Total value of these two are included in the "Transfers to SSI" item. Total premium income of the SSI comes from two sources, premium payments of employees and contribution payments of employers. According to the legal rates announced by the SSI, employees pay 10% of their gross wage as a social security premium and another 15% of gross wage is paid as social security contribution by employers. Therefore, it is assumed that 60% (40%) of total premium income is paid by employers (employees). Total value of social security contribution payments of activities, i.e. sum of $(SSCONT_s)$, is distributed among activities. Since the accounts of $OSER$ is residual, the contribution rate is relatively higher. According to the records of the GDPA, the deficit of SSI is 14.26 billion TL. Since total value of state subsidy mentioned above is 8.54 billion TL, the SSI deficit, or total value of the government transfers to the SSI, becomes 22.8 billion TL.

Consumption expenditures of the government ($GOVCON$, including wage and salaries) and transfers to households $(GTRHH)$ are compiled from national accounts and from the GDPA, respectively. The remaining expenditure items are adjusted in the following manner. The primary surplus and budget deficit, i.e. negative public savings, figures for the general government are 26.7 and 16.7 billion TL, respectively, in 2011. After separation of the SSI, government saving is still negative, 2.5 billion TL. Subtracting difference between the SSI deficit before the "state subsidy", 14.26 billion TL, from the former primary surplus value ends up with 12.5 billion TL, which is the primary surplus of the government defined in the model economy. Since government saving is equal to primary surplus minus interest payments, $GSAV = PRBAL - GFINT$, government interest payments over the foreign debt stock is calculated as 15.03 billion TL. At the end of these adjustments, transfers to enterprises $(GTRENT)$ is calculated as a residual to hold the government budget constraint. Although it is calculated as a residual, the value of transfers to enterprises is almost equal to sum of transfers/lending to enterprises and interest payments on the domestic debt stock which are readily available in the data compiled from the GDPA[4].

[4] The reason of inclusion of the latter item is the composition of domestic debt by holders. According to the Undersecretary of Treasury, only 1.59% and 1.98% of treasury bills and governments bonds are held by

### 4.2.4 Factors of Production

There are two types of factors of production in the model economy: labor and capital. It is assumed that all wage payments that is net of social security contribution payments , $CW_s\ CLD_s$, made by activities is entirely paid to labor account (labor row / activity column) which is the only income source of this account[5]. From this account, social security premium payments to the SSI ($ssppay^{hh}$, SSI row / labor column) and wage tax payments to the government ($wtax^{hh}$, government row / labor column) are made and remaining part is net wage income of households (household(s) row / labor column) and it is distributed among households. Payments to capital that includes fixed capital expenses, i.e. depreciation, is paid by activities (capital row / activities column) and this is the only income source of this account which pays its all income to enterprises (enterprise row / capital column).

HBS includes data on weekly hours of work, wage income (cash or in-kind), sector and occupation, etc. but the survey is not suitable to draw conclusions about the labor market outcomes of individuals since its representative power is valid for household level analyses. Therefore, to obtain employment structure more accurately, sectoral distribution of employment is obtained from Household Labor Force Survey (HLFS-2011). In HLFS, individual level data is collected and it provides information about supply side of the labor market. In this survey, working individuals are divided into groups which are consistent with RHGs.

In the aggregated sectoral employment figures, there are positive numbers for informal worker and capitalist, i.e. self-employed/employer, labor demand of public sector, even they are small numbers. These numbers appear because education and health services are totally aggregated into the public sector but, obviously, there are private firms that operate in these sectors and they have labor demand. These figures are added to other services' (OSER) corresponding labor demands. As mentioned in the section 3.2.1, public sector labor demand for rural residents is also set to zero and this figure is distributed among skilled and unskilled formal wage

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domestic resident private individuals and by Central Bank of the Republic of Turkey, respectively, in 2011. Another 17.26% is held by non-residents and remaining 79.17% is held by banking sector/financial institutions and other legal entities. Since all these activities are owned by the enterprises account, interest payments are included in the government transfers to this agent.

[5] Obviously, there are household types whose dominant income is the labor income, but it is not the only source.

earners since rural resident public officers are either skilled or unskilled individuals and are appointed by the government.

**Table 4.2: Composition of Employment by RHGs and Sectors**

| | RIC | | | NRIC | | Total |
|---|---|---|---|---|---|---|
| | CH | RH | SF | IW | USF | |
| **AGR** | 334 374 | 5 360 111 | 8 750 | 403 983 | 36 213 | 6 143 432 |
| **MCP** | 2 977 | 71 752 | 10 090 | 5 417 | 47 637 | 137 872 |
| **FBT** | 187 637 | 338 779 | 63 057 | 345 406 | 524 182 | 1 459 060 |
| **TEX** | 209 189 | 180 487 | 51 281 | 396 851 | 687 969 | 1 525 777 |
| **HNDG** | 62 402 | 140 728 | 98 488 | 83 590 | 438 021 | 823 229 |
| **HDG** | 151 209 | 162 917 | 163 480 | 168 748 | 849 082 | 1 495 436 |
| **SHE** | 170 849 | 88 123 | 43 835 | 158 944 | 165 184 | 626 935 |
| **CON** | 262 357 | 545 959 | 105 142 | 465 842 | 729 939 | 2 109 240 |
| **TRP** | 342 270 | 308 849 | 103 956 | 244 189 | 395 282 | 1 394 546 |
| **PSER** | | | 2 145 158 | | 991 360 | 3 136 518 |
| **OSER** | 1 231 495 | 1 405 027 | 214 253 | 898 614 | 1 509 039 | 5 258 428 |
| **Total** | 2 954 759 | 8 602 731 | 3 007 489 | 3 171 585 | 6 373 910 | 24 110 474 |

***Source:*** Author's calculations from Household Labor Force Survey-2011.

Figures in each cell of Table 4.2 correspond to sectoral labor demand by type of household, $LD_s^{hh}$, it is also equal to total labor supply of household $hh$ in the sector $s$, i.e. $sls_s^{hh}\ POP^{hh}$. The column totals of Table 4.2 are total labor supply of each RHG, $LSUP^{hh}$. By using these values and population figures, equation (3.79) allows us to calculate initial values of per capita composite labor supply, $ls^{hh}$, for each RHG, except retirees and transfer receivers. This value can also be obtained from HBS[6] but in this case, equation (3.79) may not hold. Therefore, the definition of $ls^{hh}$ is not "per capita labor supply" but "fraction of working individuals in RHG".

Initially, it was assumed that there are five labor markets, one for each wage earner RHG, and there are no wage differentials across sectors for the same type of worker. To hold sectoral cost of labor retrieved from the updated I/O table and the shares of each RHG in total wage income obtained from HBS, a routine is constructed but this led to change in sectoral composition of employment, i.e. total labor supply of each RHG is preserved but its distribution among sectors is distorted. To avoid this distortions, another approach is utilized and sectoral composition of employment and sectoral cost of labor are used to calculate wage rates. Multiplication of inverse of labor demand matrix (Table 4.2) and sectoral labor cost vector

[6] By using weekly hours of work and number of worked months information available in the survey, annual hours of work are calculated and then are divided by annual total available hours.

has to yields a wage rate vector. However, since the labor demand matrix is not square, a unique and exact solution for wage rates could not be obtained[7]. Therefore, there are 52 labor market strata which rises complications for the household problem (the second sub-stage of the second stage, as explained in 3.2.1) but allows us to use the exact employment structure and to obtain more accurate wage rates for each RHG.

Since we know the employment figures in each sector by type of household, the next step is calibrating the initial values of wage rates. From the updated input/output table, sectoral net wage payments (gross labor cost minus social security contribution payments) are distributed among households by using the shares compiled from HBS yields total wage income of RHGs[8]. Dividing them by corresponding total labor supplies, per worker composite wage rate of each RHG, $w^{hh}$, is calibrated.

Calibration process of the initial values of sectoral wage rates by type of households, $sw_s^{hh}$, needs to utilize HLFS in which wage income (including premiums and bonuses) information is available for wage earners and casual workers. However, there is no wage information for self-employed and employers. For each households, average per capita wage rates by type of households and sectors are calculated from HLFS and then these numbers are lowered in an equiproportional manner to generate positive wage income for capitalist households, i.e. $CH$. In doing so, two restrictions are used; net labor cost, i.e. gross labor cost minus social security contribution payments, of each sector obtained from the updated input/output table and total wage income by type of household calculated by using the updated input/output table and HBS are preserved.

It should be noted that the figures in Table 4.2 do not reflect the informality phenomenon in Turkish economy; total number of informal workers in 2011 was 10.1 million. The reason of this difference can be explained as follows. Informality and being an unpaid family worker are common in rural areas. However, in the model economy, households in informal sectors are assumed to live in the urban areas. Therefore, individuals who work informally but live in the rural areas are included in the group of $RH$ to keep total rural employment constant.

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[7] MATLAB uses QR factorization method for this operation.

[8] It is gross wage income that is received by household. From this amount, they pay wage tax to the government and social security premium to the social securitry institution.

### 4.2.5 Enterprises

Since enterprises account is treated as the owner of all activities, entire capital income generated by activities is received by this account. The major reason is absence of sectoral corporate tax payments. Therefore, aggregates value of corporate tax figure which is retrieved from the government accounts can be used. The major income source of this account is total amount of sectoral profits. The other income source is transfers from the government, $GTRENT$. The column of this account constitutes the expenditures which are corporate tax payments to the government (the government row), $CORPTAX$, and total amount of distributed dividends, $DISDIV$, which is written in the cells of households row. From these figures, corporate tax rate $(corptax)$ is calibrated by dividing corporate tax collection of the government to total value of sectoral gross profits, i.e. $\sum_s WK_s\, K_s$.

### 4.2.6 The Rest of the World (RoW)

This account shows the relations between agents in the economy and the rest of the world. Its column shows total foreign exchange inflows and its row shows total foreign exchange outflows. The row contains imports of commodities ($QM_s$, commodity columns) and the government's foreign interest payment ($GFINT$, government column). On the other hand, column of the RoW account includes exports ($QE_s$, activity rows) and foreign savings ($FSAV$, savings row). In the SAM balancing procedure, value of foreign savings is calculated as residual but it is so closed to the current account deficit, i.e. -9.69% of GDP in 2011.

### 4.2.7 Households

Households obtain net wage income (gross wage income minus wage tax and social security premium payments) from labor account and distributed dividends of enterprises, transfers from the government and from the SSI. Since all these income items are net-of-tax, their sum is also net-of-tax household income, i.e. disposable income. Households devote this income to either consumption or savings. Total private consumption is compiled from national accounts and subtracting it from total households income yields total private savings. This yields total private savings as 14.06% of GDP which is close enough to the official figure in

2011. In the following two subsections, compositions of income and consumption expenditures are provided.

#### 4.2.7.1 Composition of Income

HBS includes 37 income sub-items which are aggregated into 5 income types at individual level. These are wage income, asset income, unilateral transfer receipts from the government, transfer receipt from the SSI, and transfer receipts from private sources (from relatives or NGOs). Following that, these individual level income components are firstly summed over individuals for each household and then these are summed over households for each RHG. In the panel (a) of Table 4.3, shares of income sub-items in total RHG income and saving

**Table 4.3: Composition of Household Income**

| | | RIC | | | NRIC | | | |
|---|---|---|---|---|---|---|---|---|
| | | **CH** | **RH** | **SF** | **IW** | **USF** | **RET** | **TRF** |
| **Panel a:** Composition of Household Disposable Income (Vertical) | Wage Income | 1.02 | 7.85 | 29.69 | 84.14 | 61.46 | 0.00 | 0.00 |
| | Asset Income | 89.46 | 75.75 | 58.37 | 0.00 | 0.00 | 0.00 | 0.00 |
| | State Transfers | 1.47 | 5.43 | 1.90 | 15.86 | 11.37 | 0.00 | 67.49 |
| | SSI Transfers | 8.05 | 10.98 | 10.04 | 0.00 | 27.17 | 100.00 | 32.51 |
| | Saving Rate* | 21.36 | 18.09 | 13.94 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Panel b:** Households' Shares in Income Sub-items (Horizontal) | Wage Income** | 2.91 | 17.96 | 25.58 | 21.97 | 31.59 | 0.00 | 0.00 |
| | Asset Income | 53.36 | 36.15 | 10.49 | 0.00 | 0.00 | 0.00 | 0.00 |
| | State Transfers | 12.45 | 36.77 | 4.85 | 12.26 | 17.30 | 0.00 | 16.37 |
| | SSI Transfers | 26.56 | 28.96 | 9.98 | 0.00 | 16.11 | 15.33 | 3.07 |
| **Panel c:** Households' Shares in Aggregate Variables | Disposable Income | 40.86 | 32.69 | 12.31 | 3.73 | 7.34 | 1.90 | 1.17 |
| | Total Expenditures | 38.41 | 32.01 | 12.67 | 4.46 | 8.78 | 2.27 | 1.40 |
| | Savings | 53.36 | 36.15 | 10.49 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Population | 14.52 | 31.55 | 9.17 | 13.52 | 27.35 | 2.03 | 1.86 |

***Source:*** Based on the author's calculations from Household Budget Survey-2011 but they are not the original shares. For explanations, please follow the text.
***Note:*** *RIC* (*NRIC*) stands for Ricardian (non-Ricardian) households. For definitions of RHGs, please follow the text.
*: Savings / Disposable Income.
**: These figures are distribution of net wage income among households. Shares of households in gross wage income are as follows: 3.42; 13.85; 31.87; 2.65; 48.21, respectively.

rate, in the panel (b), distribution of each type of income among RHGs, and lastly in the panel (c), shares of RHGs in some aggregate variables, are shown. Definitions of income types and their composition are as follows[9]:

- *Wage income:* Annual net cash and in kind wages and salaries, bonuses and premiums, and income of extra jobs and incomes from changed job during the survey year if the person is a wage earner/casual worker.

[9] Besides these, HBS also includes *private transfers* that comprise foreign exchange income from abroad, aid and fellowship income from abroad, in-kind income from abroad, other alimony income other aid and fellowship income, and other in-kind income.

- *Asset income:* Cash and in kind income due to real estate ownership, interest income from domestic currency and foreign currency bank deposits, profit, dividend and security income, cash and in kind income due to renting of transportation vehicles and land, entrepreneurial income in cash and in kind, agricultural income due to harvest, changes in livestock value, revenue from the operation of agricultural equipment outside the farm, forestry, fishery and hunting income, income due to lending of pastures, and income of extra jobs and incomes from changed job during the survey year if the person is a self-employed/employer.
- *Government transfers:* Old-age annuity, receipts from Social Assistance Fund and Family Aid, divorced and orphan pension, veteran and disability benefits, fellowships, direct support and fuel payments and in-kind income from the government.
- *SSI transfers:* Retirement pensions, unemployment benefits, and tax rebates.

From the point of view of the government, although retiree pensions are transfer payments since the government receives nothing in exchange, pensions are not transfer receipt from the point of view of households since they paid their social security premiums when they were working. Therefore, they are not included in transfers from the government. The remaining two items in transfers from the SSI are not transfers from the point of view of households, although they are so small in magnitude.

The shares in Table 4.3-panel (b) are used to calculate **RHG-level** incomes and then these figures are divided by respective population figures to calculate per capita income items such as wage income ($winc^{hh}$), asset/capital income ($cinc^{hh}$), transfer receipts from both the government ($gtr^{hh}$) and the SSI ($str^{hh}$), composite consumption ($tc^{hh}$), and savings ($sav^{hh}$) for which aggregate variables are obtained from the national accounts to construct the SAM.

Since private transfers are not incorporated into the model economy and asset income and private savings of non-Ricardian households are eliminated and added to skilled formal RHG's respective income items, the original share parameters retrieved from HBS could not be utilized. Let's construct a matrix, of which rows are households and columns are income sub-items (wage, asset/capital, transfers from the government, transfers from the social security institution). The cells of this matrix could represent either share of each RHG in income sub-items (column sum is equal to 1) or composition of disposable income (row sum is equal

to 1). However, both of column and row sums could not be equal to 1 at the same time. Since the first approach is chosen, distribution of disposable income among RHGs (the first line of panel (c)) is distorted. Therefore, their shares in total expenditures (the second line of panel(c)) are also distorted because share of RHGs in total private savings is used to calculate savings and total consumption expenditures are residually obtained[10]. The reason of this distortion is much clear from the results of HBS analyses which reveal that the share of private transfers in total household income is more than one third and it was higher during the period of global financial crisis relative to pre-crisis years for the other RHGs as well. It should be noted that the share of private transfers and imputed rents constitute 18%, 14% and 12% of total disposables income of $USF$, $RH$ and $CH$, respectively, while it is 10% on average. Moreover, the share of the SSI transfers in total household disposable income is one fourth for informal workers but in the model economy it is assumed that they do not receive these transfers.

The other major reason of the distortion laid on the imputed incomes of RHGs. The figures in Table 4.3 for total household income and then total RHG income are obtained from individual level data while households' disposable income including imputed rent[11] and adjustments[12] is provided by TURKSTAT. It should be noted that if total household income is obtained by adding up individual incomes, it is end up with negative total savings. Since total consumption expenditures and total disposable income of households are provided within the same data file, i.e. the data file that contains information on households' socio-economic characteristics, using disposable income is more appropriate.

#### 4.2.7.2 Composition of Consumption

The budget shares of commodities, $CLES_s^{hh}$, in households' total consumption expenditures are calculated by aggregating 5-digit level expenditures into 2-digit level for 10 sectors. The

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[10] The reverse strategy, i.e. applying consumption shares firstly and then calculating savings residaully, is also applicable but in this case saving rates of RHGs, especially skilled formals, go up remarkably.

[11] For criticisms about rent imputation, see Bahçe and Köse (2014).

[12] Since families are visited in different months of the year but survey's results are announced annually, TURKSTAT adjusts monetary figures by consumer price index to make them comparable.

figures are presented in Table 4.4.

**Table 4.4: Budget Shares and Income Elasticities of Consumption by Commodities**

| | | RIC | | | NRIC | | | |
|---|---|---|---|---|---|---|---|---|
| | | **CH** | **RH** | **SF** | **IW** | **USF** | **RET** | **TRF** |
| **Panel a:** Budget Shares | **AGR** | 5.96 | 13.79 | 7.40 | 10.04 | 8.77 | 13.63 | 11.13 |
| | **MCP** | 11.41 | 7.56 | 5.46 | 3.34 | 4.06 | 3.48 | 2.32 |
| | **FBT** | 12.63 | 18.98 | 9.15 | 17.18 | 14.78 | 14.99 | 14.37 |
| | **TEX** | 15.07 | 5.99 | 6.82 | 5.68 | 5.66 | 4.15 | 4.68 |
| | **HNDG** | 6.06 | 4.31 | 3.77 | 3.42 | 3.53 | 3.71 | 4.98 |
| | **HDG** | 6.06 | 7.20 | 9.52 | 6.35 | 7.56 | 3.71 | 3.95 |
| | **SHE** | 15.23 | 10.89 | 18.62 | 20.05 | 20.51 | 18.23 | 27.14 |
| | **CON** | 0.01 | 0.04 | 0.02 | 0.02 | 0.03 | 0.07 | 0.04 |
| | **TRP** | 12.04 | 12.58 | 13.58 | 15.53 | 18.13 | 12.83 | 9.63 |
| | **OSER** | 15.53 | 18.66 | 25.66 | 18.40 | 16.98 | 25.20 | 21.75 |
| **Panel b:** Income Elasticities of Consumption | **AGR** | 1.65 | 1.27 | 0.97 | 0.65 | 0.85 | 0.99 | 0.97 |
| | **MCP** | 1.32 | 1.15 | 0.85 | 1.22 | 0.62 | 0.18 | 0.50 |
| | **FBT** | 0.98 | 0.30 | 0.76 | 0.57 | 0.88 | 0.38 | 0.72 |
| | **TEX** | 1.32 | 0.50 | 0.79 | 0.65 | 0.79 | 0.47 | 0.52 |
| | **HNDG** | 0.93 | 0.15 | 0.70 | 0.40 | 0.55 | 0.42 | 1.15 |
| | **HDG** | 8.18 | 3.38 | 2.49 | 2.56 | 1.91 | 4.62 | 3.14 |
| | **SHE** | 1.67 | 1.56 | 1.14 | 0.98 | 1.52 | 0.86 | 1.06 |
| | **CON** | 6.13 | 9.68 | 0.54 | 1.14 | 2.39 | 13.74 | 3.57 |
| | **TRP** | 1.76 | 3.36 | 0.64 | 0.94 | 1.53 | 2.30 | 1.21 |
| | **OSER** | 2.11 | 1.46 | 1.07 | 0.92 | 1.14 | 1.01 | 0.94 |

***Source:*** Author's calculations from 2002 and 2011 waves of Household Budget Survey

In order to calculate income elasticity of consumption, $incelas_s^{hh}$, for each type of household and for each commodity, the same aggregation key for consumption expenditures is applied to HBS-2002. The percentage changes in consumption by commodities is divided by percentage change in total household consumption yields income elasticity of consumption parameters.

The private consumption expenditures by RHGs are obtained as explained in the previous section and then, these expenditures are distributed by using the budget figures among commodities for each RHG, except capitalist households, to calculate the initial value of private consumption $(cd_s^{hh})$. Consumption expenditures of capitalist households are calculated as residuals to hold total private consumption demand of each commodity.

### 4.2.8 Savings and Investment

In a typical SAM, an account for the flows of funds is called as capital account. These are the loanable funds which are supplied by savings of agents and are demanded by agents who need funds. Since the model economy do not allow households to borrow from domestic/international markets, only firms need funds to finance their investment expenditures. In this case, the supply of funds comes from private savings, i.e. savings of households, public

savings which is negative and lastly foreign savings, i.e. the current account deficit. This account shows the equilibrium in the capital market, in which total savings are equal to total investment.

### 4.2.9 Investment by Destination

The final demand of a commodity is comprised by private consumption demand, government consumption demand and investment demand. The last component is called as "investment by origin". On the other hand, investments by destination, that is investment expenditures made by sectors are not displayed in a typical SAM. TURKSTAT announces total investment expenditures and change in inventories, including statistical discrepancy, as a part of the national accounts. However, its distribution across the major sectors and in distinction between private and public sectors is announced by the Ministry of Development (former State Planning Organization - SPO). However, these sectors are not sufficient to obtain investment by destination figures for each sector in the model economy. Therefore, another survey conducted by TURKSTAT, namely Annual Industry and Service Statistics is utilized. The survey contains data on fixed capital investment statistics by 2-digit NACE Rev.1 (2003-2008) and by NACE Rev.2 (from 2009 and onward) classifications. Each sector in the survey is assigned to unique activity used in the model economy and then the sectoral shares in total investment expenditures are calculated[13].

Figures for transportation and agriculture sectors are directly taken from the data of the Ministry of Development. Then, the shares of sectors obtained above are normalized and remaining investment is distributed among the other sectors. In this process, public sector's investment is set to zero. Since public capital and private capital are not modeled as imperfect substitute of each other, there is no reason to incorporate public investment expenditures into the model. Moreover, since public services are separated from the government account, investment expenditures have no effects on the budget constraint of the government and thus fiscal policy framework. Therefore, for model tractability, public investment is assumed to be zero.

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[13] It should be noted that since the survey does not cover all sectors, total investment figure of the survey data is not equal to total investment expenditures announced as a part of national accounts.

This choice leads to division of sectors into two groups w.r.t. investment decisions. In 2011, 18.6% of total investment expenditures are made by public sector and since this amount is treated as private investment expenditures, sectoral investments increased. Thus, sectoral dividends (sectoral profits minus investment by destination) of firms in the subset of $NDM$, which are main investor sectors of the Turkish economy, are decreased. This makes calibrated Tobin's q less than 1 and also leads to negative depreciation rate for these firms. Therefore, beside $PSER$, $MCP, HDG, HNDG, CON$ are separated and their problem is assumed to be intratemporal and investment expenditures are fixed fractions of current period's GDP.

### 4.2.10 Migration Related Variables and Parameters

Province level migration figures are available for five-years intervals from 1975 until 2000, based on the population censuses. Since TURKSTAT started to implement Address Based Population Registration System in 2007, yearly statistics are available in the aftermath of 2007. From these figures, provinces are classified as either less developed or developed. The former (latter) group is called as rural (urban) and migration figures are aggregated based on this classification. Accordingly, the net average migration figure is calculated as 140.181 for the period of 2007-2014 and 63.991 for the year 2011. However, to obtain gradual decrease in migration figures along the base-path, the initial level of migration is chosen as 99.186 which is coherent with the real net wage differential and total labor supply in rural areas. Once wage income and price of composite consumption are obtained, real net wage differential is calculated and by using migration value and total labor supply in rural areas, the value of parameter *migres* is calibrated by using equation (3.87). For an immigrant, the probability of being unskilled formal (informal) wage earner is arbitrarily set to 30% (70%).

## 4.3 The Definition of SAM

The following tables depicts the social accounting matrix constructed as explained above. Firstly, schematic version and then SAM for 2011 in billions TL are presented.

**Table 4.5: Schematic (Aggregated) Social Accounting Matrix**

| | **Act.** | **Com.** | **Lab.** | **Cap.** | **Enter.** | **HH** | **Gov.** | **SSI** | **Inv.** | **RoW** | **Total Receipts** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activities** | | Domestic Supply | | | | | | | | Exports | *Total Revenues from Sales* |
| **Commodities** | Intermediate Inputs | | | | | Private Cons. | Public Cons. | | Investment | | *Domestic Absorption* |
| **Labor** | Wages | | | | | | | | | | *Labor Income* |
| **Capital** | Gross Operating Surplus | | | | | | | | | | *Capital Income* |
| **Enterprises** | | | | Capital Income | | | Trans. to Enter. | | | Receipts from Abroad | *Corporate Income* |
| **Households** | | | Labor Income | | Distributed Profits (Net) | | Trans. to HH | Trans. to HH | | | *Private Income* |
| **Government** | Net Indirect Taxes on Production | Sales Taxes (VAT) + Tariffs | Payroll Taxes | | Corporate Taxes | | | | | | *Public Income* |
| **Social Sec. Inst.** | Social Sec. Contr. | | Soc. Sec. Prem. | | | | Trans. to SSI | | | | *Social Security Income* |
| **Savings** | | | | | | Private Savings | Public Savings | | | Foreign Savings | *Total Savings* |
| **Rest of the World** | | Imports | | | Payments to Abroad | | Interest Pay. to Abroad | | | | *FX Earnings* |
| **Total Exp.** | *Production Costs* | *Aggregate Absorption* | *Labor Costs* | *Capital Exp.* | *Corporate Exp.* | *Private HH Exp.* | *Public Exp.* | *Soc. Sec. Exp.* | *Total Inv.* | *FX Expenses* | |

## Table 4.6: Social Accounting Matrix - SAM (Million TL, 2011)

| | | Activity | | | | | | | | | | | Commodity | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **AGR** | **MCP** | **FBT** | **TEX** | **HNDG** | **HDG** | **SHE** | **CON** | **TRP** | **PSER** | **OSER** | **AGR** | **MCP** | **FBT** | **TEX** | **HNDG** | **HDG** | **SHE** | **CON** | **TRP** | **PSER** | **OSER** |
| **Activity** | **AGR** | | | | | | | | | | | | 182 823 | | | | | | | | | | |
| | **MCP** | | | | | | | | | | | | | 34 867 | | | | | | | | | |
| | **FBT** | | | | | | | | | | | | | | 165 200 | | | | | | | | |
| | **TEX** | | | | | | | | | | | | | | | 171 553 | | | | | | | |
| | **HNDG** | | | | | | | | | | | | | | | | 136 185 | | | | | | |
| | **HDG** | | | | | | | | | | | | | | | | | 155 750 | | | | | |
| | **SHE** | | | | | | | | | | | | | | | | | | 226 598 | | | | |
| | **CON** | | | | | | | | | | | | | | | | | | | 118 352 | | | |
| | **TRP** | | | | | | | | | | | | | | | | | | | | 286 048 | | |
| | **PSER** | | | | | | | | | | | | | | | | | | | | | 104 688 | |
| | **OSER** | | | | | | | | | | | | | | | | | | | | | | 487 273 |
| **Commodity** | **AGR** | 27 060 | 137 | 65 054 | 5 388 | 3 344 | 218 | 772 | 34 | 201 | | 8 334 | | | | | | | | | | | |
| | **MCP** | 3 304 | 19 632 | 1 496 | 2 962 | 12 735 | 4 515 | 13 542 | 4 553 | 15 688 | | 7 475 | | | | | | | | | | | |
| | **FBT** | 5 607 | 29 | 25 605 | 2 149 | 741 | 103 | 746 | 40 | 398 | | 11 777 | | | | | | | | | | | |
| | **TEX** | 172 | 78 | 398 | 84 738 | 1 406 | 2 714 | 829 | 220 | 1 085 | | 5 735 | | | | | | | | | | | |
| | **HNDG** | 7 664 | 1 391 | 11 452 | 21 311 | 54 385 | 19 896 | 9 554 | 17 462 | 5 805 | | 29 983 | | | | | | | | | | | |
| | **HDG** | 2 780 | 1 946 | 2 438 | 2 304 | 5 639 | 94 534 | 6 559 | 22 778 | 13 334 | | 21 978 | | | | | | | | | | | |
| | **SHE** | 1 357 | 1 058 | 1 547 | 3 399 | 4 565 | 5 709 | 30 790 | 1 456 | 5 659 | | 28 431 | | | | | | | | | | | |
| | **CON** | 501 | 48 | 58 | 32 | 49 | 70 | 3 118 | 2 000 | 339 | | 3 424 | | | | | | | | | | | |
| | **TRP** | 5 347 | 4 174 | 8 842 | 9 398 | 10 119 | 14 080 | 4 963 | 5 569 | 68 401 | | 33 910 | | | | | | | | | | | |
| | **PSER** | | | | | | | | | | | | | | | | | | | | | | |
| | **OSER** | 9 608 | 3 283 | 16 570 | 23 638 | 23 083 | 25 308 | 8 445 | 10 966 | 29 052 | | 111 888 | | | | | | | | | | | |
| **Factors of Production** | **Labor** | 16 389 | 4 871 | 10 963 | 19 404 | 16 364 | 20 913 | 9 495 | 13 548 | 25 662 | 85 043 | 50 137 | | | | | | | | | | | |
| | **Capital** | 103 917 | 9 770 | 32 107 | 34 079 | 30 500 | 37 084 | 134 708 | 36 665 | 134 936 | 4 754 | 233 510 | | | | | | | | | | | |
| **Enterprise** | | | | | | | | | | | | | | | | | | | | | | | |
| **Households** | **CH** | | | | | | | | | | | | | | | | | | | | | | |
| | **IW** | | | | | | | | | | | | | | | | | | | | | | |
| | **RET** | | | | | | | | | | | | | | | | | | | | | | |
| | **RH** | | | | | | | | | | | | | | | | | | | | | | |
| | **SF** | | | | | | | | | | | | | | | | | | | | | | |
| | **TRF** | | | | | | | | | | | | | | | | | | | | | | |
| | **USF** | | | | | | | | | | | | | | | | | | | | | | |
| **Government** | | 5 607 | 1 905 | 1 260 | 1 624 | 1 620 | 1 367 | 992 | 2 071 | 10 859 | | 5 478 | 5 177 | 33 573 | 25 616 | 12 699 | 6 757 | 14 016 | 3 262 | 46 | 9 298 | | 21 246 |
| **Social Security Institution** | | 2 449 | 1 455 | 2 741 | 3 424 | 4 616 | 6 971 | 2 084 | 2 391 | 6 416 | 14 892 | 20 981 | | | | | | | | | | | |
| **Savings** | | | | | | | | | | | | | | | | | | | | | | | |
| **Rest of the World** | | | | | | | | | | | | | 14 937 | 92 932 | 8 362 | 18 689 | 83 027 | 122 421 | | | 44 075 | | 39 227 |
| **Total** | | 191 762 | 49 777 | 180 533 | 213 850 | 169 165 | 233 483 | 226 598 | 119 752 | 317 838 | 104 688 | 573 040 | 202 936 | 161 372 | 199 178 | 202 942 | 225 969 | 292 187 | 229 859 | 118 399 | 339 421 | 104 688 | 547 746 |

## Table 4.6: SAM (cont.)

| | | | Factors of Prod. | | Enrteprises | HH | | | | | | | Government | SSI | Inv | RoW | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Labor | Capital | | CH | IW | RET | RH | SF | TRF | USF | | | | | |
| Activity | AGR | … | | | | | | | | | | | | | | 8 939 | 191 762 |
| | MCP | … | | | | | | | | | | | | | | 14 910 | 49 777 |
| | FBT | … | | | | | | | | | | | | | | 15 333 | 180 533 |
| | TEX | … | | | | | | | | | | | | | | 42 297 | 213 850 |
| | HNDG | … | | | | | | | | | | | | | | 32 980 | 169 165 |
| | HDG | … | | | | | | | | | | | | | | 77 733 | 233 483 |
| | SHE | … | | | | | | | | | | | | | | | 226 598 |
| | CON | … | | | | | | | | | | | | | | 1 400 | 119 752 |
| | TRP | … | | | | | | | | | | | | | | 31 790 | 317 838 |
| | PSER | … | | | | | | | | | | | | | | | 104 688 |
| | OSER | … | | | | | | | | | | | | | | 85 767 | 573 040 |
| Commodity | AGR | … | | | | 21 147 | 4 136 | 2 858 | 40 789 | 8 663 | 1 439 | 7 111 | 380 | | 5 872 | | 202 936 |
| | MCP | … | | | | 40 480 | 1 375 | 730 | 22 363 | 6 393 | 300 | 3 295 | 534 | | | | 161 372 |
| | FBT | … | | | | 44 809 | 7 079 | 3 143 | 56 146 | 10 705 | 1 858 | 11 984 | 2 392 | | 13 866 | | 199 178 |
| | TEX | … | | | | 53 492 | 2 340 | 870 | 17 704 | 7 974 | 604 | 4 586 | 2 114 | | 15 882 | | 202 942 |
| | HNDG | … | | | | 21 521 | 1 408 | 777 | 12 750 | 4 411 | 644 | 2 862 | 2 685 | | 7 | | 225 969 |
| | HDG | … | | | | 21 512 | 2 617 | 779 | 21 303 | 11 135 | 511 | 6 128 | 328 | | 53 586 | | 292 187 |
| | SHE | … | | | | 54 041 | 8 263 | 3 822 | 32 194 | 21 783 | 3 509 | 16 636 | | | 5 642 | | 229 859 |
| | CON | … | | | | 31 | 8 | 15 | 131 | 27 | 5 | 22 | | | 108 520 | | 118 399 |
| | TRP | … | | | | 42 716 | 6 400 | 2 690 | 37 202 | 15 890 | 1 246 | 14 704 | 764 | | 53 004 | | 339 421 |
| | PSER | … | | | | | | | | | | | 104 688 | | | | 104 688 |
| | OSER | … | | | | 55 117 | 7 582 | 5 285 | 55 176 | 30 026 | 2 812 | 13 772 | 66 822 | | 49 313 | | 547 746 |
| Factors of Production | Labor | … | | | | | | | | | | | | | | | 272 790 |
| | Capital | … | | | | | | | | | | | | | | | 792 032 |
| Enterprise | | … | | 792 032 | | | | | | | | | 57 624 | | | | 849 655 |
| Households | CH | … | 4 588 | | 403 709 | | | | | | | | 6 633 | 36 335 | | | 451 265 |
| | IW | … | 34 673 | | | | | | | | | | 6 534 | | | | 41 207 |
| | RET | … | | | | | | | | | | | | 20 970 | | | 20 970 |
| | RH | … | 28 336 | | 273 503 | | | | | | | | 19 596 | 39 632 | | | 361 067 |
| | SF | … | 40 360 | | 79 365 | | | | | | | | 2 584 | 13 651 | | | 135 959 |
| | TRF | … | | | | | | | | | | | 8 725 | 4 203 | | | 12 929 |
| | USF | … | 49 844 | | | | | | | | | | 9 219 | 22 036 | | | 81 099 |
| Government | | … | 69 378 | | 93 078 | | | | | | | | | | | | 326 928 |
| Social Security Institution | | … | 45 613 | | | | | | | | | | 22 796 | | | | 136 827 |
| Savings | | … | | | | 96 400 | | | 65 308 | 18 951 | | | - 2 525 | | | 127 557 | 305 692 |
| Rest of the World | | … | | | | | | | | | | | 15 034 | | | | 438 705 |
| Total | | … | 272 790 | 792 032 | 849 655 | 451 265 | 41 207 | 20 970 | 361 067 | 135 959 | 12 929 | 81 099 | 326 928 | 136 827 | 305 692 | 438 705 | |

# CHAPTER 5

# POLICY ANALYSES

One of the major characteristics of the computable / applied general equilibrium models is allowing researchers to conduct counter-factual analyses by asking "what if" questions. The model economy's details are constructed so as to obtain better results and more accurate answers. If a researcher wants to analyze the effectiveness of the monetary policies after the global financial crisis, then the model has to incorporate detailed accounts for the central bank and financial institutions. If the focus is on the countries that are crushed by the crisis remarkably, such as Greece, Spain etc., then the researcher also needs to have a model in which both government accounts and financial accounts are detailed and the links between all these agents are established.

The first research question is "what if the government devotes a larger portion of gross domestic product to unilateral transfer programs?" The reasoning behind such a policy change can be explained as follows. Turkey is criticized about the fact that the share of social assistance expenditures in gross domestic product is very low among OECD member countries. In 2012, the OECD average of this ratio was 21.5% while it was 12.3% in Turkey. Despite the small share in total household income, Başlevent (2014) states that these expenditures have positive impacts on the size distribution of income. The aim of such an experiment is to postulate the effects of changing budgetary figures of welfare transfers without altering the policy framework. Currently, welfare transfers constitute unilateral unconditional cash and in-kind payments for which there is no officially announced time limit, i.e. transfers are paid as long as individual/household can prove her/its necessity.

The bulk of the literature on the income distribution have a consensus on the fact that increas-

ing unilateral transfers dampens the labor market outcomes of recipients, either by restraining their participation to the market or by causing reductions in hours of works. As mentioned in the section 3.1, several studies remark the importance of government expenditures on education and health to improve individual efficiency and expenditures on infrastructure to increase firm level productivity. To analyze the effects of an increasing educational expenditures of the government, individuals' transitions among RHGs have to be incorporated into the model. For example, in the model economy's terminology, an unskilled formal wage earner could be a skilled formal wage earner after participating to a vocational training. Notice that unskilled formal wage earners are non-Ricardian households, while skilled formal wage earners are Ricardian households and there exist sharp contrast between the problems of these two RHGs. Thus, allowing households / individuals to belong another RHG requires cumbersome efforts within our model economy's overall structure.

On the other hand, especially in the last decade, infrastructure expenditures, excluding high-speed railroad constructions, are not directly financed by the government but rather public-private partnership model is applied. In this setup, an auction is formed by the authorized public authority and private firms (either individually or as a consortium) tender to build the infrastructure and to operate it for a pre-defines period of time, following which to hand over the management to the public. Thirty percent of total investment value has to be covered by the winner firm/consortium by using their own equity and the remaining part is financed by the Treasury guaranteed foreign borrowing. The third airport of İstanbul, the third bridge over the Bosporus, İzmir-İstanbul highway, and several hydroelectric power plants are examples of such partnership projects[1]. Since these "mega" projects have no effects on the current periods' government budget constraint, there is no reason to incorporate public infrastructure expenditures.

Although these two reasons seem to restrict the analyses of the major public policies, the details of the model economy allows us to examine the effectiveness of the government incentive policies that aim to reduce the cost of production via tax exemptions, free land allotments for factory construction and to reduce the cost of labor via full exemption for the first five years of establishment etc. The choices of government in structuring the incentive policy

[1] For details, please see `www.hazine.gov.tr`.

framework may have important effects on the income distribution. For example, the current employment incentives aim to increase total formal employment but do not consider the composition of employment. Thus, the second question of the study is "what if the government reduces/subsidizes sectoral social security contribution rate according to the sector's share in total unskilled formal wage earner employment?". Since each type of labor is assumed to be imperfect substitute for one another, lower cost of labor induces labor demand and thus raises equilibrium wage rate in each labor market stratum but it is expected that these two effects will relatively be higher for unskilled formal wage earners. An interested reader may ask that why sectoral share in total skilled formal employment is not considered. The answer relies on the fact that total skilled formal wage earner employment is half of total unskilled formal wage earner employment and wage rate of the former is 1.7 times of the latter. If a policy is designed by considering skilled formal wage earners, labor demand and thus wage rate of them will be much higher and wage differential between these two will be wider. At the end of the day, income distribution would be distorted further.

Before explaining the effects of such policy changes, explaining the dynamics along the base-path is important. Unconventionally, the base-path of the model economy described above does not follow a constant path; it rather follows a dynamic path. The reason lying behind is the way of incorporation of migration flows with endogenous labor / leisure decision. As mentioned before, migration changes only total labor supplies of migration-related households but wage rates in each labor market stratum. As populations changes in the migration-related households, their per capita transfer receipts also change. Wage income and transfer receipts affect disposable income and thus composite consumption, composite labor supply, and savings. Therefore, initialization of the variables requires to solve the entire model itself. By assuming a constant migration rate and perfectly inelastic labor supply or utilizing wage elasticity of labor supply (either calibrated or estimated from the Household Labor Force Survey) to calculate composite labor supply w.r.t changes in wage rates in each labor market stratum, model initialization would be done. However, in the former case, labor supply does not respond to wage changes while in the latter case it is assumed that there exist a constant relationship between labor supply and wage rate. This hinders the analyses in which one of the major concern is to analyze the relation between the government transfers and labor supply decision of the recipients. On the other hand, migration flows are not an unanticipated

demographic change but rather it is a phenomenon for Turkey. Therefore, the base-path of the model economy is designed as migration is part of the economic dynamics, although the calibration and the initialization processes have been completed ***as if*** the migration flow is equal to zero. In order to explain the model dynamics, definitions of three different paths should be provided:

- **base-run steady state** is a path on which all variables except the following four are exactly equal to their values shown in the SAM. On the other hand, negative government savings, $GSAV$, causes increasing government foreign debt stock ($GFDS$, equation 3.57) and thus interest payments over the outstanding debt stock, ($GFINT$, equation 3.56). Since the government finances her increasing debt stock via foreign borrowing, foreign savings, ($FSAV$, equation 3.81) also grows. Notice that this situation is independent of migration flows.

- **base-path** defines the path of the variables that includes migration flows. Migration inflows is the major source of the demographic change and it represents the dynamics in the Turkish economy. Along the base-path, there is no any policy change. In other words, it shows the "business-as-usual" case.

- **experiment path** is a path which shows the effects of change in the values of one (or more) parameter / exogenous variable on the overall economic environment in the presence of migration. In other words, it describes the answer of "what if" question.

To conduct numerical analysis, GAMS (General Algebraic Modeling System) program is used. The program has several solver options for different problems. In this study, the problem is constructed as a Mixed Complementarity Problem (MCP) since it is superior to any Non-linear Programming (NLP) problem in terms of approximation of an infinite horizon problem (Cretegny & Rutherford, 2004), which also provides theoretical solutions and GAMS codes for several problems, including a neo-classical growth model constructed as a MCP problem. Even in this simplistic application, changes in the key variables in the first couple of periods would be sharp (pages 46-7, figures 17-19). In the experiments explained below, including the base-path, changes in several variables in the first period are relatively high. For the sake of providing smooth figures, all variables are depicted for the second period of time and onwards.

This chapter has two major parts. In the first part, the base-path of the model economy is described in detail and how migration inflows change the overall economic environment such

as informality, production, the composition of labor demand etc. are explained. In the second part, the results of the above mentioned experiments are discussed.

## 5.1 Model Dynamics: The Base Path (BP)

Along the base-path, economic dynamics are driven by migration flows from rural areas to urban areas. An immigrant becomes an unskilled formal wage earner with probability 0.3 or an informal wage earner with probability 0.7. As a sensitivity analysis, the value of the probability, parameter $\alpha$, is set to 40% but the major variables show negligible responses. This section is devoted to the dynamics of the base-path by considering the macroeconomic environment. For the details of household- and sectoral-level results, see Appendix E. Unless otherwise stated, in each table (figure), the base-path *level* of each variable is shown (depicted). Moreover, percentage deviations are calculated relative to the base-run steady state.

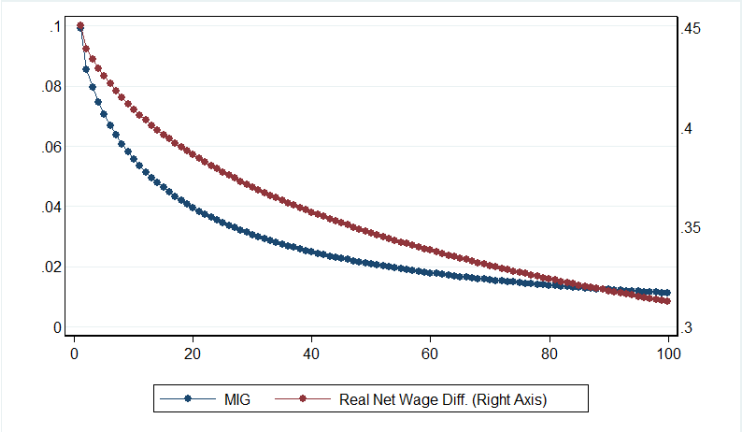



**Figure 5.1: Migration (BP)**

Due to migration, per worker composite wage rate of rural residents (unskilled formal wage earners and informal wage earners) increases (decreases) as total labor supply(ies) decreases (increase). Therefore, the real net wage differential (deviation of expected real net wage rate in the urban area from rural real net wage rate, Figure 5.1-right axis) declines from 0.45 to 0.31 (30.7%) and the level of migration declines from 99,186 to 11,170 at the end of the horizon.

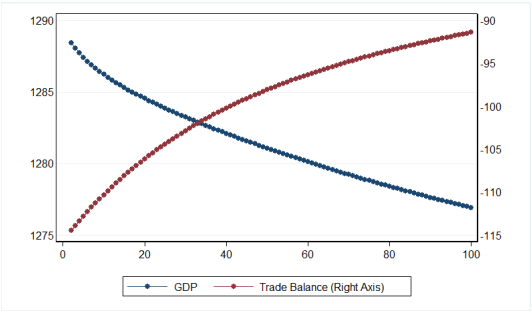
Since each type of labor is imperfect substitute for one another, substitution effects cause to lower wage rates of skilled formal wage earners and capitalist. Decreasing wage rates in

all labor market strata, excluding rural resident wage earners, lower the cost of labor for the majority of the sectors in which the shares of unskilled formal wage earners and / or informal wage earners in sectoral composite labor input are high. Decreasing labor cost increases the labor demand which in turn invokes increases in production and the value added. As output increases, both export supply and supply to the domestic market increase and thus prices of domestically produced commodities go down. As a result, gross domestic product decreases from 1,297.7 billion TL to 1,276.9 billion TL (1.6%), Figure (5.2a). Decreasing domestic prices causes and increase (decrease) in the export (import) demand at the constant world prices, which leads to an increase in the trade balance, i.e. net exports. The figures on SAM shows that imports exceeded exports in 2011 and the net export was -112.5 billion TL. In the first period of the BP, it drops to -114.5 billion TL and then, as price adjustments occur, it shrinks to -91.4 billion TL (18.8%).

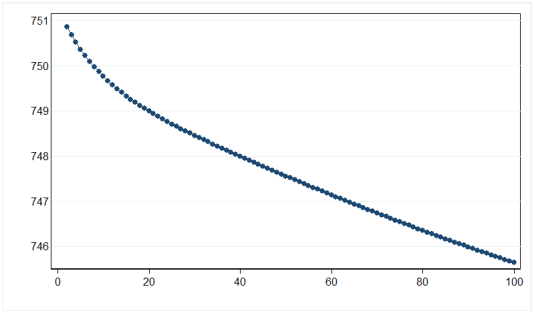
Rural resident wage earners pay social security premium but due to migration, their labor supply decline and the majority of immigrants become informal wage earners and do not pay social security premium. Thus, total social security premium collection of the SSI declines by 3.4%, at the end of the horizon. Moreover, decreasing wage rates induce composite labor demand of firms but social security contribution collection of the SSI declines by 0.94%. Since the total amount of the SSI transfers to households is fixed fraction of GDP, it also shrinks. The deficit of SSI immediately shrinks by 1.7% and then, as labor markets and production adjustments take place, it slightly increases by 0.04%, at the end of the horizon.

Decreasing prices lower profits of firms and thus corporate tax payment of enterprises decreases (1.57%). For the constant level of the government transfers to enterprises, total distributed dividends, Figure (5.2b), also decline from 756 million TL to 745.6 million TL (1.44%).

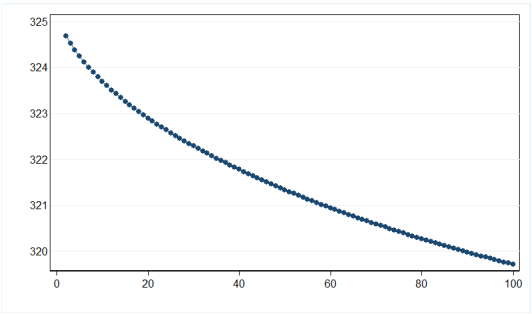
As informality increases, not only the SSI's premium income but also the government's wage tax collections shrinks (3.37%). Due to declining imports, total tariff revenues (2.77%) and total value added tax collections (2.01%) also decline. As a result, total government revenues, Figure (5.2c), decrease from 326.9 million TL to 319.7 million TL (2.2%). On the expenditure side of the government budget constraint, transfers to households (a fraction of GDP) and government consumption expenditures decline. As a result, the primary balance deteriorates



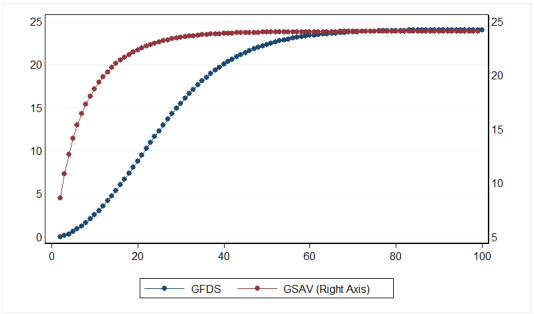

**(a) GDP and Trade Balance**




**(b) Distributed Dividends**




**(c) Government Revenues**




**(d) Gov. For. Debt Stock and Gov. Savings**

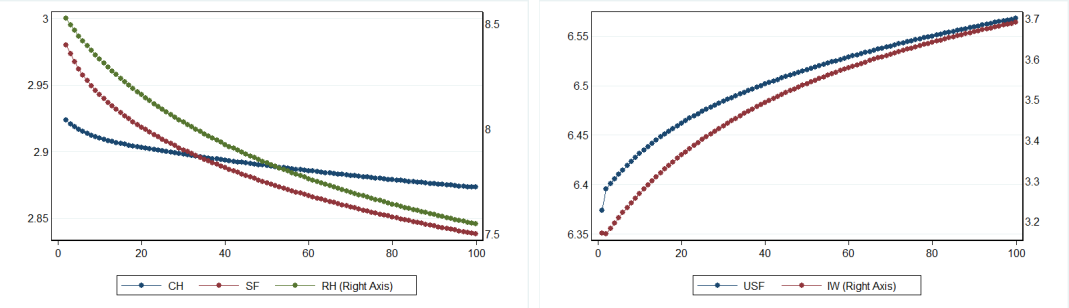
**Figure 5.2: Macroeconomic Environment (BP)**

which causes an increase in the foreign debt stock. Interest payments over the outstanding debt stock also increase and government savings decline. At the end of the horizon, increase in the foreign debt stock and the government savings, Figure (5.2c), are equal to 24.05%[2]. Since increasing foreign debt stock is financed by foreign savings, change in the foreign savings is equal to 23.9%. Notice that, change in the foreign savings is also affected by net exports to ensure the equilibrium in the rest of the world account, i.e. foreign exchange in and out flows.

Since the investment behavior of dividend maximizer sectors are determined by difference equations, equation (3.22), the first period's physical additions to the existing capital stock, $I_{DM,t}$, are assumed to be fixed. Moreover, since capital accumulation functions are also difference equations, equations (3.15) and (3.25), the first period's capital stock values, $K_{s,t}$, are also fixed. Therefore, $I_{DM,t}$ could start their adjustments in the second period of time. As a result, total investments sharply decline in the second period, then gradually approach to new

[2] Notice that, in the base-run steady state, i.e. on the SAM, government has negative savings, by 2.5 billion TL. Thus, even there exist no demographic change via migration, the foreign debt stock increases. Therefore, rather than their levels, percentage changes in the foreign debt stock and savings of the government are depicted.

equilibrium at which it is 1.75% lower than its base-run steady state value.




**(a) Ricardian Households** **(b) non-Ricardian Households**

**Figure 5.3: Total Labor Supply (BP)**

In this model economy, migration flows change not only the composition of population among households and area of residence, but also total employment and its composition among types of workers. Each household's labor supply decision and its distribution among different sectors lead to differentiated changes in sectoral wage rates and thus cost of production. As composition of production changes, demands on commodities by purposes of intermediate usage are affected. In addition, each household has different composition of consumption expenditures among commodities and thus changing population structure also affects the final demand components. Since the model economy has heterogeneous household structure and a differentiated budget constraint for each of them, it provides rich household level effects.

One of the major consequences of migration inflows is increasing informality in the labor market. According to the base-run steady state values, informal wage earners constitute 13.2% of total employment while it follows an increasing path along the base-path and reached to 15.7%. It should be noted again that working as an unpaid family worker without a social security coverage is a common phenomenon in rural areas of Turkey but since all informal workers are assumed to live in urban areas, the informality in this study is almost one third of the real data of 2011. Total labor supply is equal to sum of per capita sectoral labor supply times population. Thus, for migration-related households, changes in total labor supply include both migration and changing per capita sectoral labor supply effects. In addition, since there is no involuntary unemployment, these figures are also equal to total employment of each RHG. According to the results, along the base path, total labor supply of capitalist $(CH)$ and skilled formal wage earner households $(SF)$, Figure (5.3a)-left axis, decrease by 2.76%

and 5.6%, respectively. Total labor supply of rural residents $(RH)$ shrinks from 8.6 million to 7.54 million (12.3%), Figure (5.3a)-right axis. As migration occurs, total labor supply of rural households declines and thus wage rate goes up which, in turn, invokes increases in per capita sectoral labor supplies. Notice that, along the base-run steady state, the population figures of all households are constant. Thus, changing population figure for the end of the horizon shows the cumulative change in rural population, i.e. total number of immigrants.

Total labor supply of non-Ricardian households increase due to both migration and changing labor supply behavior. Along the base-path, since 30% of immigrants become unskilled formal wage earner, $(USF)$, total labor supply increases from 6.37 million to 6.56 million (3.04%) while change in population is equal to 4.17%. For informal wage earners, $(IW)$, on the other hand, total labor supply (population) increases from 3.17 million to 3.69 million (16.35%) (9.78 millions to 11.71 million, 19.7%). The overall effect is 2.46% increase in total employment within the economy.

## 5.2 Experiments

In this section, the results of two experiments are presented. In the first, the effects of increasing unilateral transfers of the government to households are considered. To conduct such an analysis, the transfers to gross domestic product ratio, i.e. the parameter $transs$, is increased by 20%. In the second analysis, the incentive policy of the government is adjusted rather by supporting sectors according to their share in total unskilled formal employment. In this section, the paths of the variables are called as "the experiment path" and experiments are labeled as "EXP-1" and "EXP-2", respectively. Unless otherwise stated, in each table (figure) below, the **% deviation** of each variable relative to its respective **base-path** level is shown (depicted). Moreover, as explained above, to obtain smoother figures, all variables are depicted for the second period of time and onwards.

### 5.2.1 Increasing Transfers (EXP-1)

At the end of the horizon, total value of government transfers to households increases by 20.08% due to increasing gross domestic product by 0.066%, Figure (5.5a)-left axis. More-

over, increasing GDP also affects the SSI transfers to households positively. Overall, each RHG's disposable income rises.

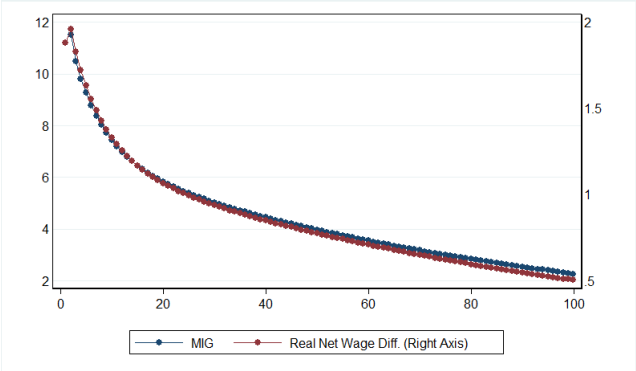



**Figure 5.4: Migration (EXP-1)**

Since non-Ricardian wage earner households respond to increasing government transfers by decreasing their per capita composite labor supplies, wage rates of these two households and the expected wage in urban areas increase. Net wage differentials, Figure (5.4)-right axis, between urban and rural widens by 1.9% immediately and thus migration is invoked. Along the EXP-1 path, migration is higher than its base-path level, Figure (5.4)-left axis.

***Macroeconomic Environment***

As wage rates of migration-related urban resident households increase, due to imperfect substitution among different labor types, wage rates in all labor market strata increase. Thus, composite labor demand declines and production shrinks. Since output decreases, export supply and supply to domestic market decline and domestic prices go up. For fixed world prices, increasing domestic prices leads to substitution of domestically produced goods with imported goods, which increases the total bill of imports. Since decreasing exports also lead to decrease in income from exports, trade balance worsens relative to the base-path by almost 5.9%, Figure (5.5a)-right axis.

As migration inflows increase relative to the BP, informality also increases and there is further decline in wage income tax collection of the government (0.1%) and in the social security premium income of the SSI (0.11%). Decreasing composite labor demand also lowers the social security contribution payments made by activities to the SSI (0.2%). As GDP increases, transfer payments made by the SSI to households increase and as a result, deficits of the

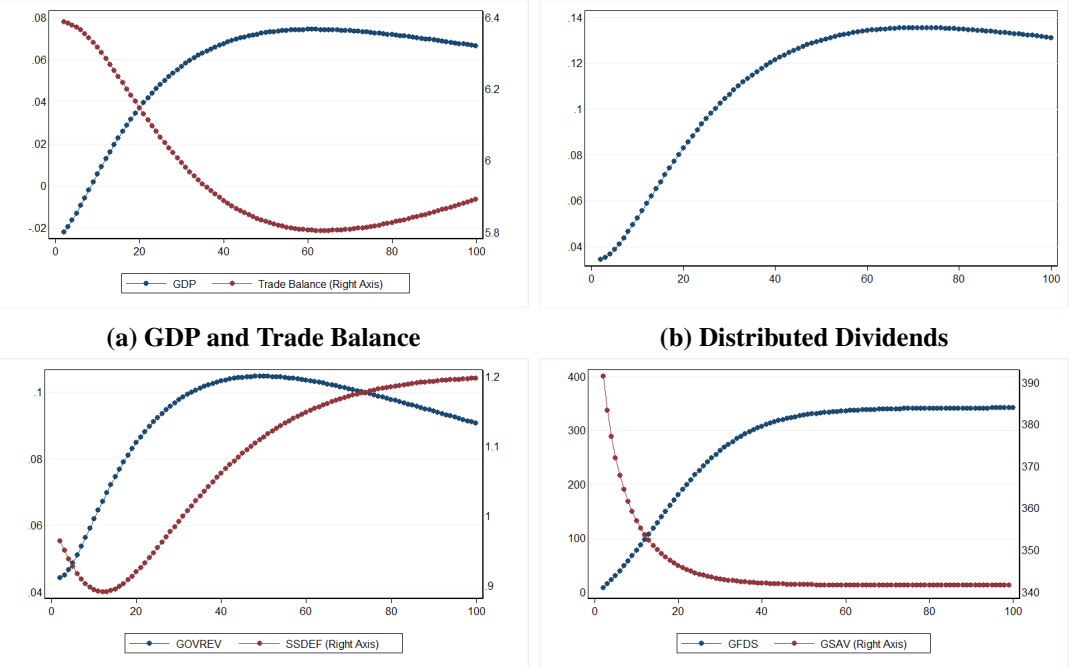
institution increase by 1.98% along the EXP-1, Figure (5.5c)-right axis.

For the majority of the sectors, the effects of decreasing sectoral outputs are compensated by increasing prices and thus total sectoral profits increase which also induce corporate tax collections of the government to increase by 0.14%. For the fixed level of government transfers to enterprises, total amount of distributed dividends increases by 0.13%, Figure (5.5b).

As sectoral outputs decline, total value of tax collections from production activities decreases by 0.05%. On the other hand, increasing imports lead to increasing tariff revenues (0.38%) and increasing domestic trade activities increases value added tax collections (0.11%). By considering decreasing (increasing) wage income taxes (corporate taxes), total revenues of the government increase by 0.09%, Figure (5.5c)-left axis. On the expenditure side, public consumption also increases as revenues increase and total amount of unilateral transfers to households increase by both the policy change and increasing GDP. For fixed level of transfers to enterprises and increasing the SSI deficits, total expenditures (except interest payments over outstanding foreign debt stock) of the government increases. Since increase in the expenditures are much higher than its revenues, the primary balance of the government worsens. Therefore, foreign debt stock starts to increase. As it increases, interest payments also increase which feeds the decrease in government savings and the debt stock follows a path in which it grows like a snowball. At the end of the horizon, government savings (foreign debt stock) are 3.53 (3.41) times higher than its base-path level, Figure (5.5d).

For dividend maximizer firms, increasing profits induce sectoral investment expenditures, including the convex adjustment cost. On the other hand, since sectoral investment expenditures of non-dividend maximizer sectors are determined as fixed fractions of GDP, they also increase but due to the effects of price of investment, $PI_t$ which is product of composite prices of domestic goods, changes in real investments are negative. Therefore, nominal value of total investment increases by 0.12% while total capital stock of the economy shrinks by 0.11%, at the end of the horizon.

Since increasing unilateral transfers have adverse effects on the non-Ricardian households' labor supply decisions, the effects of higher migration inflows on total labor supply are partially compensated. Total labor supply of unskilled formal wage earners, $USF$, sharply decreases by 1.76%, then starts to increase and as price adjustments occur, and its level becomes 1.32%




**(a) GDP and Trade Balance**

**(b) Distributed Dividends**

**(c) Government Revenues and SSI Deficit**

**(d) Gov. For. Debt Stock and Gov. Savings**

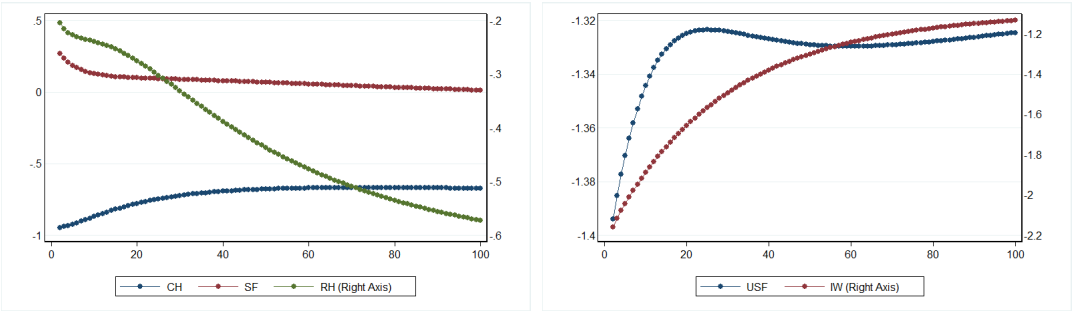
**Figure 5.5: Macroeconomic Environment (EXP-1)**

lower, relative to the base-path. For informal wage earners, *IW*, total labor supply decreases by 1.13%, Figure (5.6b).

For the Ricardian households, the adverse effects on the labor market outcomes are relatively lower than those of the non-Ricardian households. For capitalist households, *CH*, and skilled formal wage earners, *SF*, since populations are constant, change in their total labor supply is exactly equal to the change in their per capita composite labor supply, which are -0.67% and 0.01%, respectively. On the other hand, for rural resident households, *RH*, total labor supply also shrinks by 0.57%, at the end of the horizon, Figure (5.6a)-right axis. As a result, the economy-wide employment shrinks by 0.81% relative to the base-path and the share of informal employment in the total employment becomes 15.64%. This means that increasing government transfers reduce the informality by five percentage points (0.32%).

***Sectoral Results***

In addition to the investment decision heterogeneity, production activities have different intensities to engage international trade at world market prices and there are different shares of imported commodities in total final demand. Moreover, each firm's composite labor compo-




**(a) Ricardian Households** **(b) non-Ricardian Households**

**Figure 5.6: Total Labor Supply (EXP-1)**

nent of sectoral value added has different composition among different types of workers. In addition to migration flows to urban areas, the experiments analyzed in this study has different effects on each labor market stratum and thus labor demand of each activity. Therefore, heterogeneity of the production aspect of the model economy, in addition to heterogeneous household structure, also provides a rich picture to evaluate any policy change. Sectoral results for dividend maximizer sectors are provided in Table 5.1. This subset of production activities constitutes six sectors which are agriculture ($AGR$), food, beverage and tobacco ($FBT$), textile ($TEX$), shelter (house & related activities) ($SHE$), transportation ($TRP$), and other services (rest of the economy) ($OSER$).

Increasing wage rates for all types of workers cause increasing sectoral composite wages which lead to decreases in composite labor demands. The magnitudes of the changes in these two variables depend upon the differences in the composition of sectoral composite labor demand. For example, since rural resident wage earner's share in the composite labor of agriculture is the highest, decreasing total labor supply due to migration hits its composite wage and thus composite labor demand remarkably. Lower sectoral employment decreases the value added and output. Decreasing output restricts supplies to domestic market, $QD$, and foreign markets, $QE$. The optimality condition between these two, equation (3.41), implies that domestic price of domestically produced commodity increases. For fixed levels of world market prices and exchange rate, import prices in terms of domestic currency are lower than those of domestic prices which increase import demand. Increasing (decreasing) imports (domestic supply) lead to decline in composite supply, $QS$, of the commodity and lead to increase in its price, $PQ$. Decreasing total production and value added are compensated by

## Table 5.1: Sectoral Results of DM Sectors (EXP-1)

**Percentage deviations from the base-path (BP)**

| | T | WK | CW | PVA | I | K | CLD | VA | PD | QD | PX | QE | QM | PQ | QS | INV. | DIV |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 10 | 0.433 | 0.999 | 0.517 | -0.383 | 0.021 | -1.099 | -0.146 | 0.509 | -0.100 | 0.486 | -1.110 | 0.921 | 0.467 | -0.014 | 0.061 | 0.522 |
| | 30 | 0.418 | 0.912 | 0.489 | 0.031 | -0.014 | -0.989 | -0.156 | 0.478 | -0.112 | 0.456 | -1.060 | 0.845 | 0.438 | -0.032 | 0.424 | 0.400 |
| **AGR** | 50 | 0.373 | 0.867 | 0.443 | 0.044 | 0.004 | -0.973 | -0.136 | 0.434 | -0.096 | 0.414 | -0.958 | 0.774 | 0.398 | -0.023 | 0.402 | 0.373 |
| | 75 | 0.346 | 0.879 | 0.421 | 0.029 | 0.016 | -1.037 | -0.132 | 0.412 | -0.095 | 0.393 | -0.913 | 0.731 | 0.378 | -0.026 | 0.369 | 0.361 |
| | 100 | 0.337 | 0.914 | 0.416 | 0.019 | 0.019 | -1.122 | -0.139 | 0.407 | -0.102 | 0.388 | -0.911 | 0.713 | 0.373 | -0.034 | 0.351 | 0.354 |
| | 10 | 0.401 | 0.026 | 0.289 | -0.265 | -0.258 | 0.304 | -0.090 | 0.436 | -0.017 | 0.400 | -0.884 | 0.857 | 0.396 | 0.063 | 0.152 | 0.131 |
| | 30 | 0.377 | 0.136 | 0.305 | -0.199 | -0.217 | 0.144 | -0.109 | 0.415 | -0.040 | 0.380 | -0.865 | 0.793 | 0.377 | 0.037 | 0.173 | 0.142 |
| **FBT** | 50 | 0.342 | 0.169 | 0.291 | -0.172 | -0.179 | 0.079 | -0.103 | 0.384 | -0.038 | 0.351 | -0.801 | 0.731 | 0.348 | 0.032 | 0.168 | 0.154 |
| | 75 | 0.322 | 0.186 | 0.282 | -0.165 | -0.166 | 0.038 | -0.105 | 0.366 | -0.043 | 0.335 | -0.772 | 0.691 | 0.333 | 0.024 | 0.158 | 0.153 |
| | 100 | 0.314 | 0.193 | 0.278 | -0.166 | -0.166 | 0.016 | -0.112 | 0.361 | -0.051 | 0.330 | -0.769 | 0.672 | 0.328 | 0.015 | 0.151 | 0.143 |
| | 10 | 0.435 | 0.542 | 0.478 | -0.711 | -0.674 | -0.832 | -0.738 | 0.590 | -0.507 | 0.473 | -1.670 | 0.670 | 0.520 | -0.370 | -0.259 | -0.229 |
| | 30 | 0.433 | 0.584 | 0.494 | -0.555 | -0.609 | -0.832 | -0.699 | 0.571 | -0.473 | 0.456 | -1.599 | 0.667 | 0.504 | -0.340 | -0.145 | -0.206 |
| **TEX** | 50 | 0.391 | 0.585 | 0.469 | -0.504 | -0.532 | -0.819 | -0.647 | 0.536 | -0.433 | 0.428 | -1.492 | 0.638 | 0.474 | -0.308 | -0.130 | -0.152 |
| | 75 | 0.365 | 0.581 | 0.452 | -0.484 | -0.493 | -0.812 | -0.621 | 0.515 | -0.413 | 0.410 | -1.432 | 0.615 | 0.455 | -0.294 | -0.131 | -0.127 |
| | 100 | 0.355 | 0.576 | 0.444 | -0.483 | -0.483 | -0.811 | -0.615 | 0.507 | -0.410 | 0.403 | -1.411 | 0.602 | 0.448 | -0.293 | -0.138 | -0.126 |
| | 10 | 0.446 | -0.951 | 0.334 | 0.128 | 0.131 | 2.257 | 0.298 | 0.341 | 0.298 | 0.341 | | | 0.341 | 0.298 | 0.579 | 0.577 |
| | 30 | 0.415 | -0.826 | 0.316 | 0.308 | 0.194 | 2.079 | 0.342 | 0.314 | 0.342 | 0.314 | | | 0.314 | 0.342 | 0.700 | 0.582 |
| **SHE** | 50 | 0.363 | -0.746 | 0.275 | 0.297 | 0.246 | 1.930 | 0.378 | 0.277 | 0.378 | 0.277 | | | 0.277 | 0.378 | 0.650 | 0.597 |
| | 75 | 0.333 | -0.709 | 0.250 | 0.280 | 0.268 | 1.850 | 0.392 | 0.255 | 0.392 | 0.255 | | | 0.255 | 0.392 | 0.612 | 0.599 |
| | 100 | 0.322 | -0.698 | 0.241 | 0.271 | 0.271 | 1.821 | 0.392 | 0.246 | 0.392 | 0.246 | | | 0.246 | 0.392 | 0.596 | 0.592 |
| | 10 | 0.452 | 0.545 | 0.470 | -0.460 | -0.464 | -0.603 | -0.491 | 0.487 | -0.394 | 0.439 | -1.358 | 0.579 | 0.418 | -0.257 | 0.000 | -0.036 |
| | 30 | 0.422 | 0.522 | 0.441 | -0.343 | -0.366 | -0.516 | -0.395 | 0.453 | -0.304 | 0.407 | -1.201 | 0.601 | 0.389 | -0.177 | 0.065 | 0.036 |
| **TRP** | 50 | 0.378 | 0.503 | 0.402 | -0.289 | -0.299 | -0.484 | -0.335 | 0.415 | -0.250 | 0.372 | -1.072 | 0.578 | 0.356 | -0.134 | 0.080 | 0.075 |
| | 75 | 0.353 | 0.485 | 0.378 | -0.268 | -0.270 | -0.467 | -0.308 | 0.392 | -0.228 | 0.351 | -1.005 | 0.555 | 0.337 | -0.119 | 0.079 | 0.085 |
| | 100 | 0.343 | 0.475 | 0.368 | -0.266 | -0.266 | -0.462 | -0.304 | 0.382 | -0.225 | 0.343 | -0.984 | 0.540 | 0.329 | -0.119 | 0.073 | 0.079 |
| | 10 | 0.433 | 0.606 | 0.474 | -0.563 | -0.496 | -0.839 | -0.577 | 0.533 | -0.419 | 0.453 | -1.472 | 0.645 | 0.487 | -0.327 | -0.113 | -0.040 |
| | 30 | 0.432 | 0.597 | 0.471 | -0.315 | -0.421 | -0.749 | -0.499 | 0.513 | -0.344 | 0.435 | -1.358 | 0.680 | 0.468 | -0.257 | 0.091 | -0.035 |
| **OSER** | 50 | 0.387 | 0.653 | 0.450 | -0.266 | -0.322 | -0.849 | -0.447 | 0.484 | -0.300 | 0.410 | -1.258 | 0.668 | 0.442 | -0.217 | 0.103 | 0.043 |
| | 75 | 0.358 | 0.679 | 0.434 | -0.258 | -0.273 | -0.909 | -0.424 | 0.465 | -0.281 | 0.393 | -1.201 | 0.648 | 0.425 | -0.202 | 0.089 | 0.081 |
| | 100 | 0.346 | 0.678 | 0.425 | -0.263 | -0.263 | -0.921 | -0.419 | 0.455 | -0.279 | 0.384 | -1.181 | 0.631 | 0.416 | -0.202 | 0.075 | 0.083 |

**Note:** The definitions of the column variables are as follows: *T* time periods, *WK* price of sectoral capital, *CW* price of sectoral composite labor, *PVA* price of sectoral value added, *I* real physical additions to the existing capital stock, *K* physical sectoral capital stock, *CLD* sectoral composite labor demand, *VA* sectoral real value added, *PD* domestic price of domestically produced commodity, *QD* domestic supply of domestically produced commodity, *PX* price of output, *QE* export supply, *QM* import demand, *PQ* composite prices of domestic commodity, *QS* composite supply of domestic commodity, *INV* the value of nominal investment expenditures and *DIV* sectoral dividends.

price increases and when they are accompanied with decreasing costs of labor, sectoral profits rise. Since these firms choose the path of sectoral investment via maximization of the present discounted value of dividends, increasing profits induce investment and sectoral dividends.

Here, textile and shelter & related activities' behaviors significantly differ than the others. For the latter, not engaging into international trade, i.e. being home-good, determines the production and thus remaining decisions of the firm. For the former, the share of exports in total output supply is relatively higher than those of the other sectors. At fixed world prices, decreasing export supply and domestic prices reduces its profits and leads to reductions in investment expenditures and sectoral dividends.

The results for non-dividend maximizer sectors are provided in Table 5.2. These sectors are mining, coal, and petroleum (*MCP*), households non-durable goods (*HNDG*), households durable goods (*HDG*), and construction (*CON*). The main notable characteristic of these sectors is that sectoral investments are determined as fixed fractions of gross domestic product. Thus, each of them pays the bill of investment and remaining part of profits constitutes sec-

toral dividend payment. Along the path of EXP-1, as GDP increases, investment expenditures of these firms also increase. Since these firms do not bear any adjustment cost, real physical additions to the existing capital stock, $I$, is simply equal to investment, $INV$, over price of investment, $PI$. Therefore, in Table 5.2, the variables $INV$ and $I$ and thus physical capital stock, $K$, follows the exactly same path.

**Table 5.2: Sectoral Results of NDM Sectors (EXP-1)**

**Percentage deviations from the base-path (BP)**

| | T | WK | CW | PVA | I | K | CLD | VA | PD | QD | PX | QE | QM | PQ | QS | INV. | DIV |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **MCP** | 10 | 0.348 | 2.273 | 1.100 | -0.450 | -0.941 | -3.724 | -2.043 | 0.795 | -1.583 | 0.559 | -3.128 | -0.013 | 0.198 | -0.408 | 0.005 | -2.448 |
| | 30 | 0.029 | 2.160 | 0.863 | -0.330 | -0.435 | -3.534 | -1.668 | 0.649 | -1.285 | 0.453 | -2.553 | 0.001 | 0.163 | -0.325 | 0.057 | -1.804 |
| | 50 | -0.033 | 1.996 | 0.765 | -0.280 | -0.311 | -3.271 | -1.493 | 0.583 | -1.144 | 0.405 | -2.286 | 0.011 | 0.147 | -0.282 | 0.073 | -1.588 |
| | 75 | -0.054 | 1.905 | 0.719 | -0.262 | -0.269 | -3.130 | -1.415 | 0.551 | -1.082 | 0.382 | -2.163 | 0.011 | 0.139 | -0.267 | 0.073 | -1.493 |
| | 100 | -0.060 | 1.876 | 0.706 | -0.262 | -0.262 | -3.092 | -1.398 | 0.541 | -1.069 | 0.374 | -2.131 | 0.006 | 0.137 | -0.268 | 0.066 | -1.463 |
| **HNDG** | 10 | 0.375 | 1.117 | 0.678 | -0.450 | -0.941 | -1.812 | -1.297 | 0.583 | -1.075 | 0.470 | -2.219 | 0.083 | 0.358 | -0.630 | 0.005 | -6.285 |
| | 30 | -0.035 | 1.151 | 0.448 | -0.330 | -0.435 | -1.834 | -1.009 | 0.451 | -0.834 | 0.362 | -1.721 | 0.062 | 0.277 | -0.491 | 0.057 | -5.468 |
| | 50 | -0.108 | 1.094 | 0.381 | -0.280 | -0.311 | -1.732 | -0.895 | 0.402 | -0.736 | 0.322 | -1.529 | 0.062 | 0.248 | -0.431 | 0.073 | -4.941 |
| | 75 | -0.131 | 1.052 | 0.351 | -0.262 | -0.269 | -1.669 | -0.844 | 0.377 | -0.694 | 0.302 | -1.440 | 0.057 | 0.233 | -0.408 | 0.073 | -4.635 |
| | 100 | -0.137 | 1.033 | 0.340 | -0.262 | -0.262 | -1.647 | -0.831 | 0.368 | -0.684 | 0.294 | -1.412 | 0.049 | 0.228 | -0.405 | 0.066 | -4.498 |
| **HDG** | 10 | -0.070 | 1.732 | 0.700 | -0.450 | -0.941 | -3.041 | -1.848 | 0.729 | -1.375 | 0.487 | -2.798 | 0.069 | 0.401 | -0.728 | 0.005 | -14.881 |
| | 30 | -0.328 | 1.546 | 0.475 | -0.330 | -0.435 | -2.636 | -1.389 | 0.569 | -1.011 | 0.377 | -2.128 | 0.118 | 0.314 | -0.508 | 0.057 | -10.280 |
| | 50 | -0.361 | 1.434 | 0.410 | -0.280 | -0.311 | -2.424 | -1.229 | 0.511 | -0.885 | 0.337 | -1.890 | 0.131 | 0.283 | -0.433 | 0.073 | -8.623 |
| | 75 | -0.368 | 1.372 | 0.380 | -0.262 | -0.269 | -2.319 | -1.161 | 0.483 | -0.832 | 0.317 | -1.784 | 0.129 | 0.268 | -0.406 | 0.073 | -7.753 |
| | 100 | -0.371 | 1.349 | 0.370 | -0.262 | -0.262 | -2.289 | -1.144 | 0.474 | -0.821 | 0.310 | -1.754 | 0.121 | 0.263 | -0.403 | 0.066 | -7.356 |
| **CON** | 10 | 0.936 | -0.122 | 0.613 | -0.450 | -0.941 | 0.637 | -0.463 | 0.497 | -0.451 | 0.492 | -1.434 | | 0.497 | -0.451 | 0.005 | -0.218 |
| | 30 | 0.551 | 0.112 | 0.418 | -0.330 | -0.435 | 0.221 | -0.237 | 0.373 | -0.228 | 0.369 | -0.968 | | 0.373 | -0.228 | 0.057 | 0.719 |
| | 50 | 0.445 | 0.176 | 0.364 | -0.280 | -0.311 | 0.091 | -0.190 | 0.332 | -0.182 | 0.328 | -0.841 | | 0.332 | -0.182 | 0.073 | 0.769 |
| | 75 | 0.401 | 0.202 | 0.341 | -0.262 | -0.269 | 0.029 | -0.179 | 0.313 | -0.171 | 0.309 | -0.793 | | 0.313 | -0.171 | 0.073 | 0.751 |
| | 100 | 0.388 | 0.210 | 0.334 | -0.262 | -0.262 | 0.004 | -0.181 | 0.307 | -0.174 | 0.303 | -0.783 | | 0.307 | -0.174 | 0.066 | 0.742 |
| **PSER** | 10 | 0.320 | 0.864 | 0.839 | | | -0.807 | -0.771 | 0.839 | -0.771 | | | | 0.839 | -0.771 | | |
| | 30 | 0.330 | 0.819 | 0.797 | | | -0.727 | -0.694 | 0.797 | -0.694 | | | | 0.797 | -0.694 | | |
| | 50 | 0.320 | 0.773 | 0.752 | | | -0.673 | -0.643 | 0.752 | -0.643 | | | | 0.752 | -0.643 | | |
| | 75 | 0.302 | 0.727 | 0.708 | | | -0.632 | -0.604 | 0.708 | -0.604 | | | | 0.708 | -0.604 | | |
| | 100 | 0.285 | 0.694 | 0.676 | | | -0.608 | -0.581 | 0.676 | -0.581 | | | | 0.676 | -0.581 | | |

**Note:** For definitions of the column variables, please see the Note of Table 5.1.

The behavior of construction differs among the *NDM* sectors since its output is not an imported commodity. As wages go up in all labor market strata, the cost of production increases. In addition, nominal investment expenditures increase but due to the price effect, real physical investment and thus the capital stock decrease. Moreover, since rural resident households' private consumption demand is more than the half of total private consumption demand of construction, as their population decline, private consumption also decline. Therefore, there is no reason for this sector to produce more, thus output decline. Even though the substitution elasticity between capital stock and composite labor is low, despite increasing cost of labor, they slightly increase their labor demand. Decreasing output reduces supply to the domestic market and supply to the international markets. The former causes increasing domestic price which also adversely affects export supply. Since import of this commodity is equal to zero, the supply of composite domestic commodity, $QS$, is exactly equal to the supply in the do-

mestic market, $QD$. Thus supply decreases, its price increases. As sectoral profits increase at higher rate than that of increasing investment expenditures, sectoral dividends increase. For the other three sectors, increasing costs of production reduce the value added and outputs. Decreasing supplies to the domestic market increase domestic prices and lower export demand of commodities and induce import demand, due to the substitution effect. Increasing domestic prices reduces total demand and thus total supply, i.e. supplies of domestic composite commodities. As prices go down, sectoral profits and sectoral dividends shrink.

***Households***

The structure of households in terms of area of residence, having social security and intertemporal decision of savings provides a heterogeneous picture after a policy change. The results of EXP-1 are provided in Table 5.3. Increasing total budget of unilateral transfers to households by 20.08% increases disposable incomes of all households. The effect is the highest (lowest) for rural resident households (unskilled formal wage earners and informal wage earners) in per capita terms since population(s) decreases (increase) due to migration. In addition to this, wage incomes of all households increase due to wage effect but the labor market responses of households differ due to their respective budget constraints.

Capitalists', $CH$, and skilled formal wage earners', $SF$, disposable incomes increase by 0.42% and 0.6%, respectively. In addition to increasing government transfers, their dividend income (0.13%) and transfers from the SSI (0.066%) also increase. Since the share of dividend income in total disposable income is higher for the former, they can reduce their per capita composite labor supply (0.24%). On the other hand, the latter group increases per capita composite labor supply, $ls$, since wage income is a more important source of income. Although household-specific price of composite consumption, $PTC$, increases due to increasing prices of domestic composite commodities, higher level of disposable income allows them to increase per capita composite consumption, $tc$, and savings, $sav$. The behavior of rural resident households, who are also member of the subset of Ricardian households, differs from the other Ricardian households since their population is not constant but decreases due to migration. Their transfer income, both from the government and from the SSI, and dividend income rise and thus their disposable incomes increase. However, as population decreases, per capita disposable income increases faster than those of other Ricardian households. Their

per capita composite consumption also increases but their per capita savings raises by 6.17%, at the end of the horizon. As total labor supply declines, wage rate increases which affects per capita composite labor supply positively, the substitution effect[3].

**Table 5.3: Households Results (EXP-1)**

**Percentage deviations from the base-path (BP)**

| | | T | ls | LSUP | w | winc | inc | PTC | tc | sav | POP |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 10 | -0.311 | -0.870 | 0.312 | 0.000 | 0.342 | 0.409 | 0.023 | -0.006 | |
| | | 30 | -0.254 | -0.724 | 0.334 | 0.079 | 0.395 | 0.376 | 0.056 | 0.254 | |
| | **CH** | 50 | -0.236 | -0.678 | 0.342 | 0.105 | 0.418 | 0.346 | 0.086 | 0.365 | |
| | | 75 | -0.234 | -0.668 | 0.343 | 0.108 | 0.423 | 0.329 | 0.103 | 0.388 | |
| | | 100 | -0.239 | -0.673 | 0.341 | 0.101 | 0.419 | 0.322 | 0.110 | 0.365 | |
| | | 10 | 0.115 | -0.239 | 0.512 | 0.628 | 1.398 | 0.414 | 0.027 | 5.289 | -0.237 |
| | | 30 | 0.193 | -0.331 | 0.564 | 0.758 | 1.690 | 0.381 | 0.059 | 5.996 | -0.484 |
| **Ricardian** | **RH** | 50 | 0.214 | -0.437 | 0.578 | 0.793 | 1.830 | 0.350 | 0.090 | 6.184 | -0.607 |
| | | 75 | 0.232 | -0.523 | 0.592 | 0.825 | 1.920 | 0.332 | 0.108 | 6.215 | -0.695 |
| | | 100 | 0.247 | -0.573 | 0.603 | 0.852 | 1.969 | 0.325 | 0.115 | 6.171 | -0.749 |
| | | 10 | 0.062 | 0.128 | 0.516 | 0.579 | 0.583 | 0.414 | 0.052 | 1.388 | |
| | | 30 | 0.055 | 0.088 | 0.510 | 0.566 | 0.617 | 0.381 | 0.085 | 1.719 | |
| | **SF** | 50 | 0.038 | 0.068 | 0.496 | 0.534 | 0.624 | 0.350 | 0.116 | 1.823 | |
| | | 75 | 0.016 | 0.038 | 0.478 | 0.494 | 0.616 | 0.332 | 0.133 | 1.796 | |
| | | 100 | -0.003 | 0.012 | 0.464 | 0.461 | 0.604 | 0.325 | 0.140 | 1.719 | |
| | | 10 | -1.690 | -1.344 | 0.963 | -0.743 | 1.776 | 0.406 | 1.364 | | 0.079 |
| | | 30 | -1.679 | -1.324 | 0.949 | -0.746 | 1.757 | 0.376 | 1.376 | | 0.153 |
| | **USF** | 50 | -1.675 | -1.329 | 0.930 | -0.761 | 1.737 | 0.344 | 1.389 | | 0.186 |
| | | 75 | -1.671 | -1.329 | 0.909 | -0.777 | 1.715 | 0.325 | 1.386 | | 0.207 |
| | | 100 | -1.667 | -1.325 | 0.894 | -0.787 | 1.699 | 0.318 | 1.376 | | 0.219 |
| | | 10 | -2.151 | -1.889 | 0.870 | -1.300 | 1.916 | 0.406 | 1.504 | | 0.360 |
| | | 30 | -2.050 | -1.494 | 0.764 | -1.301 | 1.766 | 0.374 | 1.386 | | 0.669 |
| | **IW** | 50 | -1.996 | -1.301 | 0.717 | -1.293 | 1.696 | 0.343 | 1.348 | | 0.791 |
| | | 75 | -1.954 | -1.187 | 0.680 | -1.287 | 1.639 | 0.325 | 1.310 | | 0.864 |
| **non-** | | 100 | -1.925 | -1.135 | 0.654 | -1.284 | 1.601 | 0.318 | 1.279 | | 0.898 |
| **Ricardian** | | | | | | | 13.504 | 0.408 | 13.043 | | |
| | | | | | | | 13.562 | 0.376 | 13.136 | | |
| | **TRF** | | | | | | 13.580 | 0.344 | 13.191 | | |
| | | | | | | | 13.580 | 0.325 | 13.212 | | |
| | | | | | | | 13.573 | 0.318 | 13.213 | | |
| | | | | | | | 0.005 | 0.427 | -0.420 | | |
| | | | | | | | 0.057 | 0.396 | -0.338 | | |
| | **RET** | | | | | | 0.073 | 0.364 | -0.290 | | |
| | | | | | | | 0.073 | 0.345 | -0.271 | | |
| | | | | | | | 0.066 | 0.338 | -0.271 | | |

**Note:** The column variables are as follows: *ls* per capita (composite) labor supply, *LSUP* total labor supply, *w* per capita (composite) wage rate, *winc* per capita gross wage income, *inc* per capita disposable income, *PTC* price of composite consumption, *tc* per capita composite consumption and *sav* per capita savings and *POP* is total population.

For non-Ricardian households, the results of EXP-1 in terms of the labor market outcomes are not unexpected but obviously undesired. For unskilled formal wage earners, $USF$, and informal wage earners, $IW$, although the effects of increasing transfers are partially reduced by increasing population, per capita disposable incomes increase by 1.7% and 1.6%, respectively. For the former, disposable income is constituted by wage income and unilateral transfers from

[3] The labor market theory suggests that increasing income leads to an increase in **leisure** that is the income effect. On the other hand, increasing wage rate leads to an increase in **labor supply** that is the substitution effect.

the government and from the SSI and they have wage tax and social security premium obligations. On the other hand, the latter's disposable income is equal to sum of wage income and unilateral transfers from the government. Since both of them do not have saving decision, increasing disposable incomes allow them to decrease their labor supplies, the income effect. Therefore, their total labor supplies increase via migration while decrease by distorted individual labor supply behavior. The second effect suppresses the first and as a result, total labor supply decreases by 1.45% and 1.04%, respectively. Increasing disposable income is entirely devoted to consumption which leads to increasing per capita composite consumption by 1.33% and 1.14%, respectively.

The results of EXP-1 for the remaining non-Ricardian households also differ since the compositions of their disposable incomes are different. Increasing transfers from the government makes transfer receiver households, $TRF$, strictly better off in terms of consumption among all households. Their total and per capita disposable income, since there is no population change, increase by 13.57% along the EXP-1, relative to the base-path[4]. Although household-specific price of composite consumption increases, per capita composite consumption increases by 13.21%. On the other hand, for retirees, $RET$, the unique source of income is the transfers from the SSI which is fixed fraction of GDP. As it increases by 0.066% along the EXP-1, their disposable income also increases by exactly the same rate while due to increasing prices, per capita composite consumption shrinks by 0.27%.

### 5.2.2 Employment Subsidy (EXP-2)

In this experiment, the employment subsidy policy of the government is assumed to be altered as follows. As summarized by Yeldan (2015), after the global financial crisis of 2008-9, Turkey introduced 10 different employment subsidy programs[5]. The main aim of them is to increase the total employment but some of the programs target specific groups such as young, women, handicapped and some of them have regional aspects. These programs are mainly

[4] Along the base-path, due to decreasing GDP, disposable income of this households has a decreasing trend. Moreover, two third (one third) of their disposable income, according to the calibration made by using the Household Budget Survey, comes from the unilateral transfers from the government (SSI). Therefore, change in their disposable income is weighted average of changes in these two transfer incomes.

[5] For the effects of these programs on total employment, see Balkan et al. (2016).

financed via reductions in the social security contribution $(ssc)$ rates. The main program was enacted by the Law no. 5510 on October 2008 which reduced the *ssc* rates by five percentage points. The cost of this program constitutes almost 90% of the total cost of the programs. In this experiment, rather than treating all sectors homogeneously and reducing the *ssc* rates by the same amount, each sector's employment subsidy rate, $es_{s,t}$, is assumed to be a positive function of its share in total unskilled formal wage earner employment.

$$es_{s,t} = \alpha \frac{LD_{s,t}^{USF}}{\sum_s LD_{s,t}^{USF}} \tag{5.1}$$

In the experiments with $\alpha = 1$, the values of $es_{s,t}$ vary within the range of 0.01 (*AGR*) and 0.25 (*OSER*) with a mean of 0.13. In this case, the cost of the program, i.e. total value of forgone social security contribution collection of the SSI to GDP ratio, becomes 0.78, on the average along the experiment path. However, this figure is higher than the average realized cost of the programs, which is 0.5 between 2009 and 2013, as reported by Yeldan (2015, 38). Therefore, the value of parameter $\alpha$ is arbitrarily set to 0.7 to produce the same amount of total cost. As a result, the average of $es_{s,t}$ becomes 0.07, along the path of EXP-2, as provided in Table 5.4. In the application, *ssc* rates are multiplied by $(1 - es_{s,t})$; as the sector $s$'s share in the total unskilled formal wage earner employment increases, the sectoral subsidy rate also increases and decline in the sectoral *ssc* rate becomes higher.

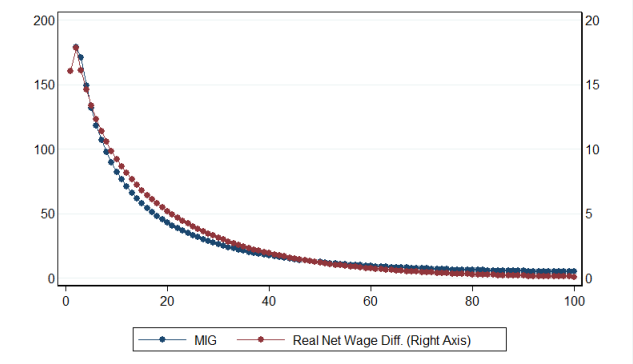



**Figure 5.7: Migration (EXP-2)**

As social security contribution rates decline in all sectors via employment subsidies, the unit costs of labor shrinks and the labor demands are stimulated in several sectors. Increasing sectoral labor demands invoke wage rates in all labor market strata, except rural resident and

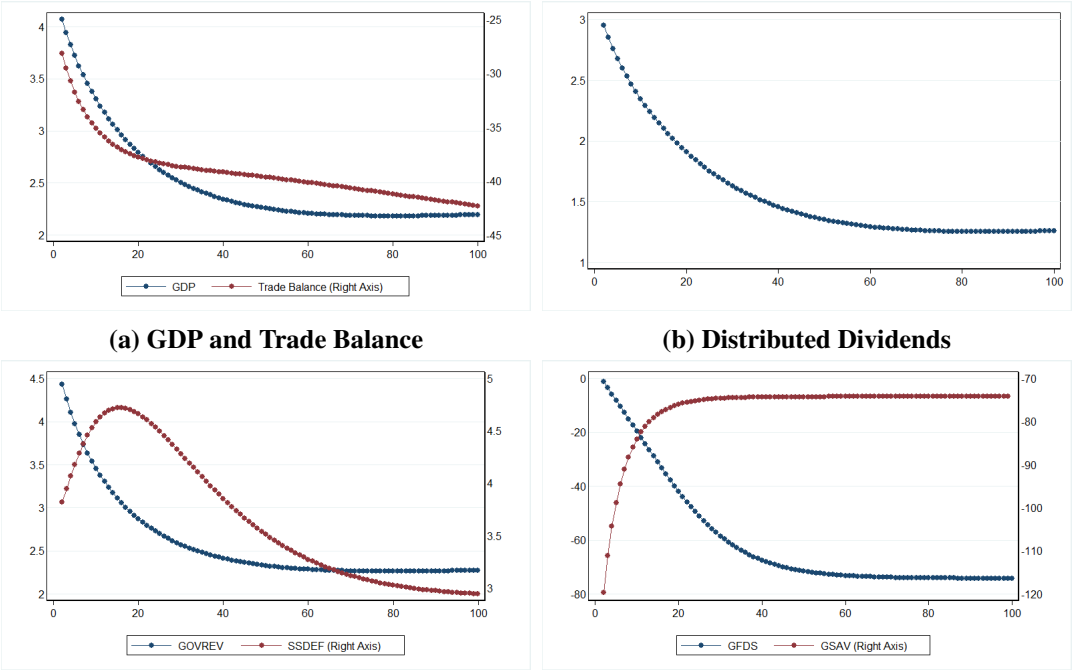
informal wage earner households. As sectoral employments increase, output prices decline. Thus, real net wage rates in all labor market strata increase and the real net wage differential among rural and urban areas widens by 17.8%, Figure (5.7)-right axis. Therefore, migration flows from rural areas to urban areas sharply increase by 180%, Figure (5.7)-left axis. As wage adjustments occur, wage rate differential and thus migration flows decline along the experiment path and at the end of the horizon; these two variables are higher relative to their base-path levels.

***Macroeconomic Environment***

Increasing sectoral labor demands lead to increasing productions and sectoral value added. As sectoral outputs increase, supplies both to domestic and international markets increase but the former reduces domestic prices. For given levels of the world prices, since exports become relatively more profitable, the majority of increasing outputs are devoted to exports. Moreover, as domestic prices decline, foreign goods become relatively expensive and consumption demands shift from imports to domestically produced commodities and thus imports shrink. As a result, net exports improve by 42.29%, at the end of the horizon, Figure (5.8a)-right axis. Increasing productions and improvement in trade balance lead to an increase in GDP by 2.19%, along the EXP-2, Figure (5.8a)-left axis.

The induced sectoral labor demands lead to increases in wage rates (except rural residents and informal wage earners) and thus in wage incomes (except informal wage earner) of households. Total social security premium income of the SSI increases by 7.26%. Increasing composite labor demand and sectoral composite wage rates increase the total bill of employment but subsidized social security contribution rates imply that total amount of the SSI's revenues from firms shrinks by 1.35%. As GDP increases, total value of transfer payments made by the SSI to households also increases. These changes in income and expenditure items of the SSI imply that deficits of the institution increases by 4.72% in the medium-run. As wage adjustments occur in all labor market strata, the change of the deficit becomes 2.95%, at the end of the horizon, Figure (5.8c)-right axis. Increasing sectoral productions and exports improve profits of the sectors and thus corporate tax payments of enterprise, the owner of all production activities, by 1.37%. For the fixed level of transfer receipt from the government, distributed dividends increase by 1.26%, Figure (5.8b).

As sectoral outputs increase, total tax collection of the government from production activities increases by 2.5%. As imports decline, demands shift to the domestically produced commodities and the total value added tax collection increases by 0.93% but tariff revenues decrease by 1.14%, at the end of the horizon. Induced labor demands increase the wage rates and wage income and thus wage tax collections of the government by 7.2%, relative to the BP.




**(a) GDP and Trade Balance**

**(b) Distributed Dividends**

**(c) Government Revenues and SSI Deficit**

**(d) Gov. For. Debt Stock and Gov. Savings**

**Figure 5.8: Macroeconomic Environment (EXP-2)**

The major source of increasing wage tax collections is increased wage income of skilled formal wage earners. Moreover, migration flows reduce (increase) total labor supply(ies) of rural resident (informal wage earner) households who (do not) have wage tax and social security premium obligations. Along the EXP-2, it would be expected that total values of these two payments of households to the government and the SSI, respectively, decline. However, although the employment subsidy increases migration, its labor demand effects suppress decreasing labor supply effect and wage income of the rural resident households increases and thus it makes positive contributions to wage tax and social security premium revenues of the government and the SSI, respectively.

In sum, production tax, value added tax, wage income tax, and corporate tax collections of

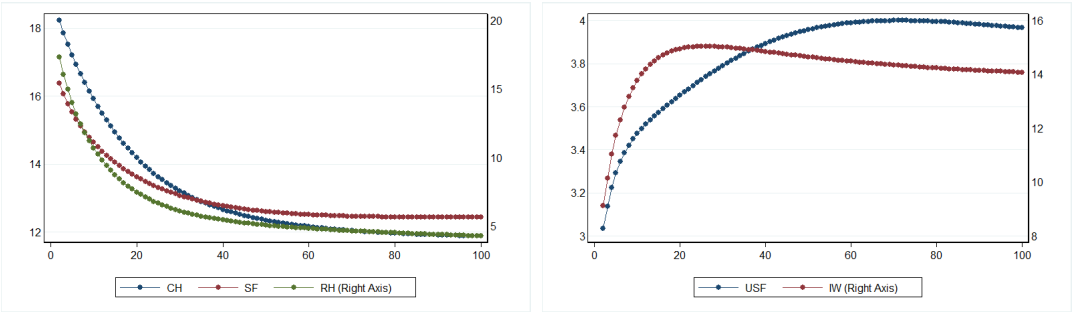
the government increase while only tariff revenues shrink due to declining imports. As a result, government's total revenues increase along the EXP-2. The transitional growth rate of government revenues starts from 4.43%, relative to the base-path, and drops to 2.27% at the end of the horizon, the Figure (5.8c)-left axis. On the other hand, total public consumption on commodities (due to increasing revenues), unilateral transfers to households (due to increasing GDP) and transfers to the SSI to cover the institution's deficits increase. For the given level of transfers to enterprise, total government expenditures also increase, except interest payments over the existing foreign debt stock. Since the transitional growth rate of the revenues is greater than that of the total expenditures, the primary balance improves and allows the government to reduce its foreign debt stock. Along the EXP-2, the government savings (the primary balance minus interest payments) also improve and it drop by 74%, at the end of the horizon. Thus, the foreign debt stock also shrinks, Figure (5.8d).

The nominal investment expenditures (sum of nominal value of new physical additions to the existing capital stock and the convex adjustment cost) of the *DM* firms increase due to increasing profits. Moreover, sectoral investment expenditures of the *NDM* sectors also increase due to increasing GDP. Therefore, the nominal value of total investment expenditures and total capital stock of the economy increase by 1.67% and 2.74%, respectively, at the end of the horizon.

As GDP increases, unilateral transfer receipts of households from the government and from the SSI increase as well. Moreover, for the Ricardian households, increasing total value of distributed dividends induce their per capita dividend income. The effects of these three income items are higher for the rural resident households, relative to the other two Ricardian households, as population in the rural areas declines due to migration. On the contrary, the same effect works inversely for unskilled formal wage earners and informal wage earners as their populations increase[6]. Therefore, all but informal wage earner households' disposable incomes increase. In addition, employment subsidy program leads to increase in labor demands and boost wage rates, except for rural resident households and informal wage earner households. However, labor supplies of all households increase. Under this particular set of calibrated / chosen parameters, these results show that the substitution effect suppresses the

[6] These two households do not get dividend income and the latter does not receive transfers from the SSI.

income effect for all households. As prices of domestic composite goods decline, household-specific price of composite consumption also decline and the decreases in the latter are greater than the increases in nominal wage rates, in absolute terms, for the aforementioned two households. Thus, their real wages increase and they respond by increasing their per capita composite labor supplies.




**(a) Ricardian Households** **(b) non-Ricardian Households**

**Figure 5.9: Total Labor Supply (EXP-2)**

The Ricardian households' labor supplies change along the EXP-2 as depicted in Figure (5.9a). Due to migration, total population in rural areas shrinks by 6.6% while total labor supply increases by 4.3%. On the other hand, capitalist household's (skilled formal wage earner's) total labor supply increases by 11.8% (12.4%), relative to the BP. Among the non-Ricardian households, unskilled formal wage earners and informal wage earners supply their labor forces. For the former households, population increases by 1.93%, while total labor supply increases by 3.96%. For the latter household, these two figures are 7.9% and 14.07%, respectively. Total labor supplies of these two households are depicted in Figure (5.9b), where informal wage earners are on the right axis. In sum, the employment subsidy program leads to an increase in total labor supply by 7.65%, while the informality (total informal wage earner employment over total employment) becomes 16.63% which corresponds to an enlargement by 5.97%, relative to the BP.

***Sectoral Results***

The figures in Table 5.4 show sectoral subsidy rates. The subsidy rates are lowest for agriculture, *AGR*, while the highest for other services, *OSER*, along the experiment path. These figures also indicate that how employment subsidies affect the sectoral composition of total

unskilled formal wage earner employment. Apparently, unskilled formal wage earners shift from the dividend maximizer sectors to the non-dividend maximizer sectors.

**Table 5.4: Employment Subsidy Rates**

| | DM Sectors | | | | | | NDM Sectors | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **T** | **AGR** | **FBT** | **TEX** | **SHE** | **TRP** | **OSER** | **MCP** | **HNDG** | **HDG** | **CON** |
| 10 | 0.0061 | 0.0567 | 0.0739 | 0.0157 | 0.0404 | 0.1883 | 0.0073 | 0.0505 | 0.1093 | 0.0791 |
| 30 | 0.0053 | 0.0532 | 0.0721 | 0.0147 | 0.0400 | 0.1841 | 0.0075 | 0.0522 | 0.1123 | 0.0794 |
| 50 | 0.0049 | 0.0515 | 0.0710 | 0.0144 | 0.0398 | 0.1839 | 0.0076 | 0.0525 | 0.1136 | 0.0788 |
| 75 | 0.0047 | 0.0502 | 0.0702 | 0.0141 | 0.0396 | 0.1835 | 0.0076 | 0.0527 | 0.1151 | 0.0780 |
| 100 | 0.0045 | 0.0492 | 0.0697 | 0.0139 | 0.0395 | 0.1829 | 0.0076 | 0.0530 | 0.1165 | 0.0773 |

In order to better understand the sectoral effects, model dynamics have to be mentioned again. In the model, there are 52 labor market strata for 11 sectors and five types of workers. In each labor market stratum, the equilibrium

$$LD_{s,t}^{hh} = POP_{t}^{hh}\ sls_{s,t}^{hh} \tag{3.77}$$

solves the equilibrium wage rate, where $LD_{s,t}^{hh}$ is the sector $s$'s labor demand from the household type $hh$, $POP_{t}^{hh}$ is population of the household type $hh$, and $sls_{s,t}^{hh}$ is the household type $hh$'s labor supply to the sector $s$. This equation solves $sw_{s,t}^{hh}$, which is called as "the wage rate of household type $hh$ in sector $s$". Table 5.5 provides sectoral results by the labor market strata for the *DM* sectors. The employment subsidy program increase the labor demands in **almost all** strata while their effects on the wage rates depend upon the behaviors of households, i.e. supply side effects.

As employment subsidy reduces the unit labor cost, **Agriculture** increases its labor demands in all strata. The share of rural households' in sectoral labor composite is almost 90%, but increasing rural household demand is the lowest because the sector tries to change the employment composition to benefit more from the subsidy. The skilled formal wage earner demand is doubled, relative to the base-path, but it should be noted that the share of this type of household in sectoral composite labor is only 0.08%. Thus, the effects on the other types of workers are negligible. As population of rural households shrinks due to migration, their sectoral labor supplies to the agriculture increase, by the equation 3.77, and sectoral wage rate, i.e. $sw_{AGR,t}^{RH}$, declines. As a result, sectoral composite labor demand (wage) increases (decreases). Therefore, the value added and output increase by 2.3%, at the end of the horizon. The sectoral supplies to both markets increase but since the world prices are fixed, export supply increases

6 times more than that of the domestic market. As domestic supply increases, domestic price declines and makes it relatively cheaper than its imported substitute. Thus, import demand declines. Due to increasing domestic supply, supply of domestic composite commodity increases and its price goes down. Since composite labor demand expands, total labor cost also expands and reduces profits. Declining profits hit sectoral investment and sectoral dividend payments too.

**Table 5.5: Labor Market Outcomes by Segments - DM Sectors**

**Percentage deviations from the base-path (BP)**

| | | **Labor Demand** | | | | | **Wage Rate** | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **RIC** | | | **non-RIC** | | **RIC** | | | **non-RIC** | |
| | **T** | **CH** | **RH** | **SF** | **USF** | **IW** | **CH** | **RH** | **SF** | **USF** | **IW** |
| **AGR** | 10 | 77.79 | 36.02 | 131.49 | 78.49 | 75.56 | -21.96 | -16.56 | -26.94 | -22.04 | -21.71 |
| | 25 | 66.04 | 29.17 | 113.30 | 67.37 | 67.50 | -19.45 | -14.34 | -24.33 | -19.65 | -19.68 |
| | 50 | 58.84 | 25.99 | 104.64 | 61.45 | 61.41 | -18.45 | -13.59 | -23.45 | -18.78 | -18.78 |
| | 75 | 57.04 | 25.34 | 103.27 | 60.16 | 59.72 | -18.07 | -13.32 | -23.18 | -18.47 | -18.41 |
| | 100 | 56.84 | 25.31 | 103.69 | 60.14 | 59.47 | -18.02 | -13.29 | -23.21 | -18.45 | -18.36 |
| **FBT** | 10 | 5.93 | -29.11 | 57.39 | 6.56 | 3.95 | 1.10 | 15.58 | -11.40 | 0.90 | 1.74 |
| | 25 | 3.86 | -28.73 | 51.22 | 5.11 | 5.23 | 1.39 | 14.65 | -10.53 | 0.88 | 0.81 |
| | 50 | 2.11 | -27.87 | 49.32 | 4.63 | 4.60 | 1.71 | 14.21 | -10.39 | 0.89 | 0.90 |
| | 75 | 1.47 | -27.65 | 49.42 | 4.51 | 4.07 | 1.93 | 14.09 | -10.41 | 0.93 | 1.07 |
| | 100 | 1.25 | -27.69 | 49.85 | 4.46 | 3.81 | 2.03 | 14.14 | -10.47 | 0.97 | 1.18 |
| **TEX** | 10 | 2.71 | -31.26 | 52.61 | 3.32 | 0.79 | 2.67 | 17.38 | -10.02 | 2.47 | 3.32 |
| | 25 | 2.15 | -29.91 | 48.73 | 3.38 | 3.50 | 2.15 | 15.50 | -9.86 | 1.64 | 1.56 |
| | 50 | 0.91 | -28.71 | 47.57 | 3.40 | 3.37 | 2.32 | 14.88 | -9.86 | 1.49 | 1.50 |
| | 75 | 0.43 | -28.39 | 47.89 | 3.44 | 3.01 | 2.46 | 14.68 | -9.95 | 1.45 | 1.59 |
| | 100 | 0.29 | -28.38 | 48.43 | 3.47 | 2.82 | 2.52 | 14.69 | -10.04 | 1.45 | 1.67 |
| **SHE** | 10 | -9.10 | -39.17 | 35.06 | -8.56 | -10.80 | 9.14 | 24.77 | -4.36 | 8.92 | 9.83 |
| | 25 | -11.81 | -39.48 | 28.41 | -10.74 | -10.64 | 9.87 | 24.24 | -3.05 | 9.32 | 9.24 |
| | 50 | -12.14 | -37.94 | 28.48 | -9.97 | -10.00 | 9.65 | 23.12 | -3.39 | 8.77 | 8.78 |
| | 75 | -12.17 | -37.37 | 29.34 | -9.54 | -9.91 | 9.56 | 22.63 | -3.70 | 8.49 | 8.64 |
| | 100 | -12.17 | -37.27 | 29.99 | -9.38 | -9.95 | 9.54 | 22.55 | -3.88 | 8.41 | 8.64 |
| **TRP** | 10 | -3.02 | -35.10 | 44.08 | -2.45 | -4.84 | 5.66 | 20.80 | -7.40 | 5.46 | 6.33 |
| | 25 | -3.55 | -33.82 | 40.42 | -2.39 | -2.28 | 5.10 | 18.84 | -7.26 | 4.57 | 4.49 |
| | 50 | -4.51 | -32.55 | 39.64 | -2.15 | -2.19 | 5.18 | 18.10 | -7.33 | 4.33 | 4.34 |
| | 75 | -4.85 | -32.15 | 40.12 | -2.00 | -2.41 | 5.26 | 17.82 | -7.48 | 4.23 | 4.37 |
| | 100 | -4.88 | -32.07 | 40.78 | -1.86 | -2.47 | 5.26 | 17.76 | -7.63 | 4.17 | 4.39 |
| **OSER** | 10 | 15.12 | -22.96 | 71.04 | 15.80 | 12.96 | -3.02 | 10.88 | -15.01 | -3.21 | -2.40 |
| | 25 | 13.31 | -22.25 | 64.98 | 14.68 | 14.81 | -3.12 | 9.55 | -14.51 | -3.60 | -3.67 |
| | 50 | 13.41 | -19.89 | 65.84 | 16.21 | 16.17 | -3.49 | 8.37 | -14.97 | -4.27 | -4.26 |
| | 75 | 13.65 | -18.96 | 67.36 | 17.05 | 16.56 | -3.69 | 7.81 | -15.34 | -4.63 | -4.50 |
| | 100 | 13.68 | -18.81 | 68.26 | 17.29 | 16.56 | -3.71 | 7.72 | -15.51 | -4.71 | -4.51 |

In **Food, beverage and tobacco**, the labor demand of rural households shrinks by 30% while the labor demand of skilled formal wage earners increases by 50% and increases in the other labor market strata are moderate. These developments adversely affect the wage rates and since the rural households' share in the sectoral composite labor is much higher than that of the skilled formal wage earners, composite wage increases which reduces the composite labor demand. Increasing the value added and production, although sectoral composite labor

demand declines, is the reason of increasing capital stock. Since the export intensity of the sector is high, as domestic price goes down, export supply increases by 6%, while change in domestic supply is only 0.86%, at the end of the horizon. As domestic price of the commodity goes down, imports decrease. Increasing domestic supply of composite commodity reduces its price. Increasing profits induce investment expenditures and thus sectoral dividends.

**Textile**'s composite labor demand is constituted by informal workers and unskilled formal wage earners. The moderate labor demand increases for these two workers are observed, while it seems that the sector changes its labor demand composition in favor (against) of skilled formals (rural residents). Thus, their wage rates in the textile sector decline (increase) which lead to increases in the sectoral composite wage rate. For lower elasticity of substitution, i.e. harder substitution, increasing sectoral investment and capital stock lead to increasing composite labor demand, despite its rising cost. As capital stock and composite labor input increase, the value added and thus sectoral output increase. It is one of the major exportable goods of the Turkish economy and, at the same, its domestic demand is high (almost 10% in total private consumption). Thus, the supply to the domestic market (abroad) increase by 2.95% (7.7%) which reduces domestic price of it. Relatively expensive imports lead to decreasing imports. Increasing domestic supply of composite good lowers its price. As profits increase, sectoral investment expenditures and sectoral dividends increase.

The behavior of **Shelter** totally depends upon domestic price and demand developments since it produces a non-tradable good. As domestic prices decline in all sectors, its price also declines and so does demand to its commodity increases. Except skilled formal wage earners, the sector reduces its labor demand for all types of labors which leads to a decrease in composite labor demand and an increase in its price. Although labor input decline, sectoral value added and output increase to cover the increased demand.

In **Transportation**, the share of skilled formal wage earners in sectoral composite labor is the highest and it is followed by unskilled formal wage earners and informal wage earners, respectively. Thus, firms increase their skilled formal labor demand, while the reduction in unskilled formal wage earner demand is relatively low. As a result, sectoral composite wage rate increases but composite labor demand increases. Therefore, the value added and output of the sector increase which induce increasing supplies to the domestic and to the international

## Table 5.6: Sectoral Results of DM Sectors (EXP-2)

**Percentage deviations from the base-path (BP)**

| | T | WK | CW | PVA | I | K | CLD | VA | PD | QD | PX | QE | QM | PQ | QS | INV. | DIV |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 10 | -1.794 | -16.667 | -4.342 | 3.198 | -1.699 | 36.739 | 3.608 | -4.017 | 3.195 | -3.826 | 12.015 | -4.930 | -3.693 | 2.502 | 0.815 | -4.212 |
| | 30 | -2.468 | -14.454 | -4.419 | -1.100 | -1.081 | 28.755 | 2.997 | -4.112 | 2.576 | -3.916 | 11.563 | -5.687 | -3.781 | 1.871 | -3.449 | -3.536 |
| **AGR** | 50 | -2.374 | -13.694 | -4.174 | -1.415 | -1.162 | 26.626 | 2.587 | -3.900 | 2.190 | -3.714 | 10.652 | -5.626 | -3.585 | 1.524 | -3.657 | -3.482 |
| | 75 | -2.282 | -13.423 | -4.023 | -1.332 | -1.241 | 25.963 | 2.375 | -3.769 | 1.993 | -3.588 | 10.138 | -5.550 | -3.464 | 1.351 | -3.517 | -3.491 |
| | 100 | -2.256 | -13.400 | -3.976 | -1.263 | -1.263 | 25.932 | 2.307 | -3.728 | 1.930 | -3.550 | 9.977 | -5.529 | -3.427 | 1.295 | -3.435 | -3.493 |
| | 10 | -1.679 | 3.825 | -0.415 | 4.205 | 4.333 | -2.193 | 2.354 | -2.541 | 1.894 | -2.321 | 7.275 | -3.218 | -2.312 | 1.419 | 2.138 | 3.119 |
| | 30 | -1.892 | 3.431 | -0.663 | 3.546 | 3.725 | -2.629 | 1.806 | -2.722 | 1.313 | -2.486 | 7.062 | -4.128 | -2.478 | 0.807 | 1.506 | 2.073 |
| **FBT** | 50 | -1.763 | 3.393 | -0.574 | 3.275 | 3.351 | -2.784 | 1.503 | -2.589 | 1.035 | -2.364 | 6.478 | -4.129 | -2.357 | 0.556 | 1.369 | 1.724 |
| | 75 | -1.678 | 3.444 | -0.493 | 3.168 | 3.188 | -2.923 | 1.351 | -2.496 | 0.901 | -2.279 | 6.133 | -4.074 | -2.273 | 0.439 | 1.336 | 1.603 |
| | 100 | -1.648 | 3.505 | -0.451 | 3.155 | 3.155 | -3.022 | 1.301 | -2.462 | 0.856 | -2.247 | 6.012 | -4.049 | -2.242 | 0.402 | 1.347 | 1.596 |
| | 10 | -1.347 | 3.428 | 0.088 | 6.895 | 6.069 | 0.475 | 3.796 | -1.722 | 3.067 | -1.375 | 6.710 | -0.451 | -1.523 | 2.652 | 4.857 | 4.467 |
| | 30 | -1.997 | 2.325 | -0.723 | 6.162 | 6.344 | 1.317 | 4.304 | -2.339 | 3.287 | -1.860 | 8.295 | -1.489 | -2.072 | 2.724 | 3.945 | 4.441 |
| **TEX** | 50 | -1.929 | 2.187 | -0.729 | 5.888 | 6.020 | 1.295 | 4.104 | -2.306 | 3.096 | -1.829 | 8.020 | -1.604 | -2.043 | 2.544 | 3.777 | 4.134 |
| | 75 | -1.848 | 2.186 | -0.675 | 5.802 | 5.837 | 1.227 | 3.968 | -2.248 | 2.980 | -1.780 | 7.771 | -1.599 | -1.993 | 2.443 | 3.762 | 3.977 |
| | 100 | -1.820 | 2.210 | -0.645 | 5.804 | 5.804 | 1.191 | 3.934 | -2.225 | 2.951 | -1.760 | 7.691 | -1.580 | -1.973 | 2.421 | 3.783 | 3.960 |
| | 10 | -1.466 | 9.913 | -0.649 | 6.040 | 4.401 | -11.006 | 3.117 | -0.979 | 3.117 | -0.979 | | | -0.979 | 3.117 | 3.695 | 2.630 |
| | 30 | -2.340 | 10.107 | -1.454 | 3.559 | 4.294 | -12.534 | 2.891 | -1.572 | 2.891 | -1.572 | | | -1.572 | 2.891 | 1.184 | 2.050 |
| **SHE** | 50 | -2.190 | 9.615 | -1.350 | 3.578 | 3.941 | -12.048 | 2.616 | -1.475 | 2.616 | -1.475 | | | -1.475 | 2.616 | 1.332 | 1.763 |
| | 75 | -2.083 | 9.401 | -1.266 | 3.684 | 3.777 | -11.791 | 2.491 | -1.403 | 2.491 | -1.403 | | | -1.403 | 2.491 | 1.505 | 1.647 |
| | 100 | -2.051 | 9.366 | -1.240 | 3.745 | 3.745 | -11.738 | 2.469 | -1.382 | 2.469 | -1.382 | | | -1.382 | 2.469 | 1.583 | 1.631 |
| | 10 | -1.278 | 5.525 | -0.172 | 6.467 | 6.297 | -2.637 | 4.535 | -0.940 | 4.335 | -0.845 | 6.325 | 2.382 | -0.809 | 4.058 | 4.608 | 5.462 |
| | 30 | -1.834 | 4.660 | -0.780 | 5.817 | 5.959 | -2.581 | 4.275 | -1.459 | 3.958 | -1.308 | 7.059 | 0.947 | -1.256 | 3.532 | 3.785 | 4.382 |
| **TRP** | 50 | -1.736 | 4.481 | -0.730 | 5.476 | 5.540 | -2.578 | 3.941 | -1.408 | 3.632 | -1.262 | 6.614 | 0.734 | -1.213 | 3.224 | 3.566 | 3.934 |
| | 75 | -1.664 | 4.436 | -0.678 | 5.345 | 5.359 | -2.581 | 3.795 | -1.361 | 3.496 | -1.218 | 6.371 | 0.699 | -1.173 | 3.102 | 3.504 | 3.768 |
| | 100 | -1.643 | 4.420 | -0.664 | 5.333 | 5.333 | -2.555 | 3.779 | -1.348 | 3.481 | -1.206 | 6.329 | 0.709 | -1.162 | 3.092 | 3.509 | 3.751 |
| | 10 | -2.013 | -5.354 | -4.197 | 4.607 | 3.073 | 23.856 | 7.827 | -4.038 | 6.421 | -3.406 | 15.566 | -2.000 | -3.703 | 5.681 | 2.052 | 0.437 |
| | 30 | -2.772 | -5.639 | -4.796 | 2.688 | 3.221 | 22.540 | 7.657 | -4.585 | 6.028 | -3.855 | 16.464 | -3.473 | -4.208 | 5.195 | 0.006 | 0.548 |
| **OSER** | 50 | -2.699 | -6.164 | -4.874 | 2.302 | 2.653 | 23.401 | 7.402 | -4.619 | 5.750 | -3.877 | 16.240 | -3.793 | -4.240 | 4.916 | -0.264 | -0.039 |
| | 75 | -2.603 | -6.434 | -4.871 | 2.261 | 2.347 | 23.958 | 7.286 | -4.602 | 5.631 | -3.857 | 16.068 | -3.867 | -4.226 | 4.803 | -0.232 | -0.363 |
| | 100 | -2.567 | -6.472 | -4.851 | 2.300 | 2.300 | 24.043 | 7.270 | -4.586 | 5.613 | -3.840 | 16.009 | -3.851 | -4.212 | 4.790 | -0.172 | -0.405 |

**Note:** The definitions of the column variables are as follows: *T* time periods, *WK* price of sectoral capital, *CW* price of sectoral composite labor, *PVA* price of sectoral value added, *I* real physical additions to the existing capital stock, *K* physical sectoral capital stock, *CLD* sectoral composite labor demand, *VA* sectoral real value added, *PD* domestic price of domestically produced commodity, *QD* domestic supply of domestically produced commodity, *PX* price of output, *QE* export supply, *QM* import demand, *PQ* composite prices of domestic commodity, *QS* composite supply of domestic commodity, *INV* the value of nominal investment expenditures and *DIV* sectoral dividends.

markets. Thus, domestic price of its output decreases. At fixed world prices, export is more profitable but since total domestic demand is high as well, import demand also increases, despite its substitute, i.e. domestically produced good, is relatively cheaper. Thus, supply of domestic composite commodity increases and its price declines. Increasing profits invoke investment expenditures and sectoral dividends.

Lastly, **Other Services**'s composite labor demand composition changes against rural residents households. Decreasing sectoral wage rates reduce sectoral composite wage and induce its demand. Increasing the value added and output increase supplies both to the domestic and to the international markets. As domestic price of it declines, import demand also declines. Increasing profits lead to an increase in sectoral investment expenditures and thus sectoral dividends.

In terms of labor market outcomes, except *MCP*, the other *NDM* sectors follow exactly the same patterns. The reason of the divergence of the **Mining, coal, and petroleum** is that the share of rural resident households in the composite labor input is the second highest across the

**Table 5.7: Labor Market Outcomes by Segments - NDM Sectors**

**Percentage deviations from the base-path (BP)**

| | | Labor Demand | | | | | Wage Rate | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | RIC | | | non-RIC | | RIC | | | non-RIC | |
| | T | CH | RH | SF | USF | IW | CH | RH | SF | USF | IW |
| MCP | 10 | 49.79 | 0.24 | 122.55 | 50.68 | 46.98 | -14.98 | -2.80 | -25.49 | -15.15 | -14.44 |
| | 25 | 51.93 | 4.25 | 121.21 | 53.76 | 53.93 | -16.11 | -5.14 | -25.97 | -16.53 | -16.59 |
| | 50 | 47.53 | 4.22 | 115.74 | 51.17 | 51.12 | -15.38 | -4.99 | -25.45 | -16.06 | -16.06 |
| | 75 | 45.80 | 3.97 | 114.71 | 50.17 | 49.55 | -14.97 | -4.82 | -25.26 | -15.80 | -15.68 |
| | 100 | 45.61 | 3.99 | 115.50 | 50.22 | 49.29 | -14.92 | -4.82 | -25.34 | -15.80 | -15.63 |
| HNDG | 10 | 8.79 | -27.20 | 61.64 | 9.44 | 6.75 | -0.24 | 14.05 | -12.57 | -0.44 | 0.39 |
| | 25 | 11.17 | -23.72 | 61.86 | 12.51 | 12.63 | -2.16 | 10.63 | -13.66 | -2.65 | -2.72 |
| | 50 | 9.98 | -22.31 | 60.83 | 12.70 | 12.66 | -1.99 | 10.04 | -13.66 | -2.79 | -2.78 |
| | 75 | 9.34 | -22.03 | 61.02 | 12.62 | 12.15 | -1.81 | 9.91 | -13.69 | -2.77 | -2.63 |
| | 100 | 9.21 | -22.00 | 61.64 | 12.68 | 11.97 | -1.76 | 9.90 | -13.80 | -2.78 | -2.58 |
| HDG | 10 | 21.51 | -18.68 | 80.54 | 22.24 | 19.24 | -5.60 | 7.92 | -17.28 | -5.79 | -5.01 |
| | 25 | 21.21 | -16.83 | 76.49 | 22.67 | 22.81 | -6.15 | 6.12 | -17.18 | -6.62 | -6.69 |
| | 50 | 18.97 | -15.96 | 73.97 | 21.90 | 21.86 | -5.77 | 5.81 | -16.98 | -6.53 | -6.52 |
| | 75 | 18.33 | -15.62 | 74.26 | 21.88 | 21.37 | -5.61 | 5.65 | -17.04 | -6.54 | -6.41 |
| | 100 | 18.44 | -15.42 | 75.29 | 22.19 | 21.43 | -5.66 | 5.54 | -17.22 | -6.64 | -6.45 |
| CON | 10 | 4.73 | -29.92 | 55.60 | 5.35 | 2.76 | 1.68 | 16.25 | -10.89 | 1.48 | 2.32 |
| | 25 | 7.30 | -26.38 | 56.22 | 8.59 | 8.71 | -0.56 | 12.44 | -12.25 | -1.06 | -1.13 |
| | 50 | 7.50 | -24.06 | 57.20 | 10.16 | 10.12 | -0.87 | 11.31 | -12.66 | -1.67 | -1.66 |
| | 75 | 7.46 | -23.38 | 58.24 | 10.67 | 10.21 | -0.95 | 10.87 | -12.94 | -1.92 | -1.78 |
| | 100 | 7.50 | -23.23 | 59.10 | 10.91 | 10.21 | -0.98 | 10.78 | -13.11 | -2.01 | -1.80 |
| | | | | | | | | | | | |
| PSER | 10 | | | -3.85 | -34.90 | | | | 13.36 | 29.09 | |
| | 25 | | | -3.45 | -32.89 | | | | 11.67 | 25.91 | |
| | 50 | | | -3.39 | -32.30 | | | | 11.41 | 25.43 | |
| | 75 | | | -3.32 | -32.38 | | | | 11.38 | 25.48 | |
| | 100 | | | -3.22 | -32.54 | | | | 11.40 | 25.64 | |

sectors. Therefore, the sector can not reduce its rural household demand. As its demand increases, rural households also increase sectoral labor supply, i.e. $sls^{RH}_{MCP,t}$, to cover the effects of decreasing population. Therefore, their sectoral composite wage rate declines and composite labor demand and thus sectoral value added as well as output, increase. As supplies to the domestic market and to the international market increase, domestic price and thus import demand decline. Since its investment is a fixed share of GDP, it also increases but increasing profits allow the firms to increase sectoral dividend payments.

The sectors of **Household non-durable goods** and **Households durable goods** have similar compositions of sectoral composite labor input. Unskilled formal wage earners constitute 53% and 62% of total labor demand, respectively. Thus, they replace their rural resident labor demands by skilled formal wage earners. In these strata, wage rates decline and sectoral composite wage rates decrease. Increasing composite labor inputs induce production and thus supplies to the domestic and to the international markets. As domestic supplies increase, their prices decline and import demands shrink. Since sectoral profits increase more than sectoral

investment expenditures which are fixed fractions of GDP, profits and thus sectoral dividends increase.

**Table 5.8: Sectoral Results of NDM Sectors (EXP-2)**

**Percentage deviations from the base-path (BP)**

| | T | WK | CW | PVA | I | K | CLD | VA | PD | QD | PX | QE | QM | PQ | QS | INV. | DIV |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 10 | -4.092 | -8.117 | -5.771 | 5.849 | 11.002 | 18.674 | 13.982 | -4.183 | 10.983 | -2.897 | 20.884 | 1.894 | -1.084 | 4.139 | 3.304 | 16.186 |
| | 30 | -1.124 | -9.986 | -4.845 | 4.921 | 5.896 | 22.232 | 12.168 | -3.773 | 9.478 | -2.598 | 18.231 | 1.373 | -0.980 | 3.390 | 2.506 | 11.346 |
| **MCP** | 50 | -0.600 | -9.676 | -4.427 | 4.554 | 4.807 | 21.310 | 11.164 | -3.520 | 8.662 | -2.415 | 16.735 | 1.147 | -0.916 | 3.025 | 2.256 | 9.913 |
| | 75 | -0.452 | -9.453 | -4.258 | 4.426 | 4.477 | 20.753 | 10.769 | -3.416 | 8.334 | -2.337 | 16.132 | 1.059 | -0.890 | 2.883 | 2.184 | 9.391 |
| | 100 | -0.412 | -9.441 | -4.239 | 4.425 | 4.425 | 20.743 | 10.747 | -3.409 | 8.306 | -2.326 | 16.085 | 1.048 | -0.890 | 2.871 | 2.194 | 9.288 |
| | 10 | -3.497 | 0.113 | -2.486 | 5.849 | 11.002 | 7.651 | 9.623 | -2.686 | 8.426 | -2.151 | 14.494 | 2.680 | -1.669 | 6.196 | 3.304 | 45.103 |
| | 30 | 0.517 | -2.113 | -1.038 | 4.921 | 5.896 | 10.847 | 7.897 | -2.118 | 6.962 | -1.691 | 11.641 | 2.479 | -1.317 | 5.232 | 2.506 | 43.803 |
| **HNDG** | 50 | 1.228 | -2.242 | -0.685 | 4.554 | 4.807 | 10.823 | 7.235 | -1.918 | 6.388 | -1.528 | 10.589 | 2.347 | -1.193 | 4.833 | 2.256 | 41.372 |
| | 75 | 1.428 | -2.211 | -0.560 | 4.426 | 4.477 | 10.699 | 6.989 | -1.837 | 6.175 | -1.462 | 10.186 | 2.310 | -1.144 | 4.691 | 2.184 | 39.888 |
| | 100 | 1.479 | -2.208 | -0.533 | 4.425 | 4.425 | 10.713 | 6.965 | -1.820 | 6.155 | -1.446 | 10.127 | 2.326 | -1.134 | 4.687 | 2.194 | 39.236 |
| | 10 | -0.617 | -5.843 | -4.064 | 5.849 | 11.002 | 22.440 | 15.805 | -4.207 | 12.393 | -2.764 | 22.483 | 3.134 | -2.363 | 8.187 | 3.304 | 106.163 |
| | 30 | 2.527 | -6.662 | -2.778 | 4.921 | 5.896 | 22.646 | 12.867 | -3.568 | 10.021 | -2.328 | 18.313 | 2.310 | -2.006 | 6.541 | 2.506 | 79.128 |
| **HDG** | 50 | 3.048 | -6.557 | -2.477 | 4.554 | 4.807 | 22.010 | 11.973 | -3.361 | 9.294 | -2.184 | 17.028 | 2.071 | -1.892 | 6.045 | 2.256 | 69.473 |
| | 75 | 3.232 | -6.550 | -2.403 | 4.426 | 4.477 | 21.932 | 11.756 | -3.307 | 9.106 | -2.140 | 16.698 | 2.008 | -1.864 | 5.921 | 2.184 | 64.791 |
| | 100 | 3.327 | -6.646 | -2.419 | 4.425 | 4.425 | 22.209 | 11.846 | -3.326 | 9.164 | -2.146 | 16.805 | 2.022 | -1.878 | 5.964 | 2.194 | 62.849 |
| | 10 | -6.208 | 4.779 | -3.397 | 5.849 | 11.002 | -4.293 | 6.193 | -2.746 | 6.121 | -2.713 | 12.199 | | -2.746 | 6.121 | 3.304 | 12.914 |
| | 30 | -3.099 | 1.826 | -1.997 | 4.921 | 5.896 | 0.090 | 4.114 | -2.050 | 4.061 | -2.025 | 8.462 | | -2.050 | 4.061 | 2.506 | 3.769 |
| **CON** | 50 | -2.358 | 1.150 | -1.666 | 4.554 | 4.807 | 1.192 | 3.704 | -1.853 | 3.656 | -1.830 | 7.607 | | -1.853 | 3.656 | 2.256 | 3.190 |
| | 75 | -2.090 | 0.905 | -1.546 | 4.426 | 4.477 | 1.638 | 3.613 | -1.779 | 3.567 | -1.757 | 7.352 | | -1.779 | 3.567 | 2.184 | 3.449 |
| | 100 | -2.017 | 0.835 | -1.513 | 4.425 | 4.425 | 1.791 | 3.624 | -1.762 | 3.578 | -1.741 | 7.327 | | -1.762 | 3.578 | 2.194 | 3.625 |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 10 | 7.488 | 16.458 | 16.028 | | | -11.328 | -10.835 | 16.028 | -10.835 | | | | 16.028 | -10.835 | | |
| | 30 | 6.312 | 14.597 | 14.204 | | | -10.647 | -10.185 | 14.204 | -10.185 | | | | 14.204 | -10.185 | | |
| **PSER** | 50 | 6.068 | 14.354 | 13.962 | | | -10.670 | -10.208 | 13.962 | -10.208 | | | | 13.962 | -10.208 | | |
| | 75 | 6.035 | 14.394 | 14.000 | | | -10.758 | -10.295 | 14.000 | -10.295 | | | | 14.000 | -10.295 | | |
| | 100 | 6.069 | 14.482 | 14.086 | | | -10.818 | -10.353 | 14.086 | -10.353 | | | | 14.086 | -10.353 | | |

**Note:** For definitions of the column variables, please see the Note of Table 5.6.

The behavior of **Construction** differs since its output is not imported. As a result of the employment subsidy, the sector also changes the composition of its composite labor input in favor of skilled formal wage earners and against rural residents. As wage rate in the former (latter) decreases (increases), sectoral composite wage increases. However, decreasing all domestic prices affects domestic price of the sector's output and induces its demand. Therefore, sectoral production increases. Since the sector is an exporter sector, its export supply also increases. In sum, sectoral profits and sectoral dividends increase.

### *Households*

Households results, along the path of EXP-2, are provided in Table 5.9. Changes in households' behaviors are also closely related with labor market outcomes, provided and explained above.

The Ricardian households benefit from the employment subsidy program extensively in three aspects. First, their labor demands and thus wage incomes increase. Secondly, as employment increases, total output increases and prices decline which allow them to increase their consumptions. Thirdly all households, especially skilled formal wage earners, increase their

savings, relative to the BP.

**Table 5.9: Households Results (EXP-2)**

**Percentage deviations from the base-path (BP)**

| | | T | ls | LSUP | w | winc | inc | PTC | tc | sav | POP |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Ricardian** | **CH** | 10 | 5.867 | 15.918 | 1.131 | 7.064 | 2.487 | -2.079 | 0.944 | 16.483 | |
| | | 30 | 4.799 | 13.213 | 0.698 | 5.530 | 1.753 | -2.358 | 1.232 | 13.030 | |
| | | 50 | 4.465 | 12.348 | 0.561 | 5.051 | 1.476 | -2.295 | 1.167 | 11.742 | |
| | | 75 | 4.353 | 11.997 | 0.512 | 4.887 | 1.382 | -2.248 | 1.118 | 11.351 | |
| | | 100 | 4.344 | 11.884 | 0.504 | 4.869 | 1.385 | -2.234 | 1.104 | 11.425 | |
| | **RH** | 10 | 0.414 | 10.708 | -1.191 | -0.782 | 5.580 | -2.175 | 0.747 | 34.150 | -3.396 |
| | | 30 | 1.039 | 6.124 | -0.794 | 0.237 | 7.123 | -2.468 | 1.050 | 36.644 | -5.492 |
| | | 50 | 1.356 | 5.087 | -0.583 | 0.766 | 7.527 | -2.400 | 0.980 | 35.656 | -6.084 |
| | | 75 | 1.548 | 4.593 | -0.448 | 1.093 | 7.819 | -2.349 | 0.927 | 34.703 | -6.414 |
| | | 100 | 1.642 | 4.295 | -0.377 | 1.258 | 8.046 | -2.335 | 0.912 | 34.135 | -6.608 |
| | **SF** | 10 | 9.027 | 14.637 | 6.452 | 16.062 | 6.484 | -2.301 | 1.019 | 59.986 | |
| | | 30 | 8.167 | 13.078 | 5.514 | 14.131 | 5.354 | -2.605 | 1.335 | 53.808 | |
| | | 50 | 8.070 | 12.604 | 5.335 | 13.835 | 5.045 | -2.544 | 1.271 | 53.089 | |
| | | 75 | 8.141 | 12.451 | 5.314 | 13.888 | 4.969 | -2.496 | 1.221 | 54.273 | |
| | | 100 | 8.243 | 12.444 | 5.340 | 14.023 | 4.991 | -2.481 | 1.206 | 55.990 | |
| **non-Ricardian** | **USF** | 10 | 0.412 | 3.475 | 3.362 | 3.788 | 3.159 | -1.905 | 5.163 | | 1.130 |
| | | 30 | 0.496 | 3.790 | 2.205 | 2.711 | 1.963 | -2.270 | 4.331 | | 1.738 |
| | | 50 | 0.544 | 3.957 | 1.974 | 2.528 | 1.709 | -2.199 | 3.996 | | 1.865 |
| | | 75 | 0.565 | 3.999 | 1.922 | 2.498 | 1.646 | -2.144 | 3.874 | | 1.913 |
| | | 100 | 0.568 | 3.966 | 1.928 | 2.507 | 1.650 | -2.127 | 3.860 | | 1.931 |
| | **IW** | 10 | 0.316 | 13.779 | 0.999 | 1.318 | 0.845 | -2.080 | 2.988 | | 5.144 |
| | | 30 | 0.467 | 15.014 | -0.559 | -0.095 | -0.784 | -2.396 | 1.652 | | 7.582 |
| | | 50 | 0.479 | 14.651 | -0.910 | -0.435 | -1.141 | -2.326 | 1.213 | | 7.938 |
| | | 75 | 0.471 | 14.286 | -1.003 | -0.536 | -1.231 | -2.273 | 1.067 | | 7.974 |
| | | 100 | 0.460 | 14.075 | -0.996 | -0.540 | -1.219 | -2.257 | 1.062 | | 7.931 |
| | **TRF** | | | | | | 3.304 | -2.157 | 5.581 | | |
| | | | | | | | 2.506 | -2.484 | 5.117 | | |
| | | | | | | | 2.256 | -2.406 | 4.777 | | |
| | | | | | | | 2.184 | -2.348 | 4.640 | | |
| | | | | | | | 2.194 | -2.329 | 4.632 | | |
| | **RET** | | | | | | 3.304 | -2.265 | 5.698 | | |
| | | | | | | | 2.506 | -2.596 | 5.237 | | |
| | | | | | | | 2.256 | -2.530 | 4.910 | | |
| | | | | | | | 2.184 | -2.478 | 4.781 | | |
| | | | | | | | 2.194 | -2.462 | 4.774 | | |

**Note:** The column variables are as follows: *ls* per capita (composite) labor supply, *LSUP* total labor supply, *w* per capita (composite) wage rate, *winc* per capita gross wage income, *inc* per capita disposable income, *PTC* price of composite consumption, *tc* per capita composite consumption and *sav* per capita savings and *POP* is total population.

For instance, as it is evident from Table 5.5 and Table 5.7, except $FBT$, $TEX$, $SHE$, $TRP$, sectoral wage rates of capitalists decrease. Since the shares of $SHE$ and $TRP$ sectors in composite per capita labor supply, $ls_t^{CH}$, are relatively high, wage rate, $w_t^{CH}$, increases. Since population of this group is constant, it is clear from equation (3.77) that, change in per capita sectoral labor supply is exactly equal to change in sectoral labor demand. Thus, their total labor supply also increases by 11.9%, at the end of the horizon. As GDP increases, total and per capita unilateral transfer incomes also increase. In addition, increasing distributed dividends also affect per capita dividend income. Thus, per capita disposable income also increases by 1.38%. Decreasing prices of domestic composite commodities decrease household-specific price of composite consumption. As a result, capitalists increase their per capita composite

consumption by 1.1%. Declining prices lower total nominal consumption expenditures which allow them to increase their savings by 11.4%, relative to the BP.

For rural resident households, since the shares of *AGR* and *MCP* sectors in composite labor supply are relatively high, declining sectoral wage rates of rural residents households in those sectors lower the composite wage by 0.38%, relative to the BP. The reason is that as their population decline due to migration, they have to increase their per capita sectoral labor supplies in those sectors to meet the increase in demands. Since per capita supplies grow faster, per capita wage rates drop larger. Increasing total labor supply compensates the decreasing wage rate and total wage income increases by 1.26%. Since total values of transfer receipts form the government and the SSI and also total value of dividends increase, their per capita counterparts increase at a higher rate due to declining population. Thus, per capita disposable income increases by 8.05%, relative to the BP. Due to decreasing prices, per capita composite consumption increases by 0.91% but their per capita savings rise by 34.1%.

Due to employment subsidy program, all sectors try to change their compositions of composite labor inputs across different household types. This process affects skilled formal households remarkably since their demand for labor increase in all but the public services sector. It should be noted that, from Table 4.2, 55.6% of total skilled formal wage earners are employed in *PSER* and another 23% in *OSER*, in the base-run steady state. For instance, the *AGR* and *MCP* sectors' *SF* demands almost double along the EXP-2 path but, again from Table 4.2, these sectors' shares in total *SF* employment are only 0.29% and 0.34%, respectively. Thus, relatively huge increases in skilled formal employment affect this households' labor market outcomes but there is no noteworthy change in the overall outlook. For instance, the share of skilled formal employment in total employment becomes 12.07% along the EXP-2 but this ratio is 12.47% in the base-run steady-state and 12.06% along the BP. To sum up the developments for this household, per capita wage income (14.02%) and per capita disposable income (4.99%) increase, which allow them to increase composite consumption by 1.2% and per capita savings by 55%, at the end of the horizon.

Total labor demand to *USF* increases by 3.97%, at the end of the horizon. Due to increasing sectoral wage rates, per capita wage income increases by 2.5%. Total values of the government and the SSI transfers increase but increasing population reduce their per capita values

and thus, increase in per capita disposable income becomes 1.65%, relative to the BP. Decreasing prices increases per capita composite consumption by 3.86%.

The sectoral labor demands of informal wage earners also increase in all but $SHE$ and $TRP$ sectors. As their population increases by 7.93%, the condition (3.77) implies that the changes in per capita sectoral labor supplies do not have to be too much. Moreover, since the sectoral shares of $OSER$, $TRP$, and $SHE$ in per capita composite labor supply are the highest, changes in these sectors' labor demands determine the wage rate of informal workers. As a result, their per capita composite wage rate declines by 0.99% along the path of EXP-2 and total labor supply increases by 14.07%. In addition to decreasing per capita wage income, since the growth rate of population exceeds the growth rate of increasing government transfers, per capita disposable income decreases by 1.21%. Since decline in disposable income is lower than the decline in household-specific price of composite consumption, in absolute terms, per capita composite consumption increases by 1.06%. The other two non-Ricardian households per capita disposable incomes grow at rate that are exactly equal to the transitional growth rate of GDP. By the help of declining prices, their per capita composite consumptions increase.

## 5.3 Income Distribution

This section is devoted to provide the income distribution results of the base-path and the experiment paths. The values of the variables along the base-run steady state, i.e. their values on the Social Accounting Matrix, are used as benchmark. This approach allows readers also to evaluate solely the effects of migration flows. Moreover, in the tables below, the end of horizon results are provided. As mentioned before, there are two basic definitions of the income distribution. The size distribution of income deals with the distribution of income among individuals, whereas the functional income distribution deals with how income is distributed across factors of productions or among socio-economic groups, such as area of residence, educational attainment, etc. For the former, per capita and total disposable income of households are provided. For the latter, how total wage is changes relative to total capital income is considered.

In the top panel of Table 5.10, per capita disposable incomes and in the middle panel, total dis-

posable incomes are shown. Three households', (capitalists, unskilled formal wage earners, and informal wage earners) per capita disposable incomes decline in all cases. For the former, since population is constant, the same pattern is also observed for total terms. In EXP-2, the decline is negligible, while it is the highest along the EXP-1. For the latter two households, populations increase due to migration, thus their total disposable incomes increase (except for $USF$ along the BP) but per capita disposable incomes shrink. For $USF$, the negative effects of migration on total disposable income is compensated by increasing transfers and subsidizing employment; while as their populations increase, they are getting worse off in terms of per capita terms. In terms of total disposable income, informal workers are always better off and the effect is the highest if firms are subsidized. On the other hand, in per capita terms, since employment subsidy expands migration and thus population of $IW$ remarkably, they are strictly worse off, by almost 10% reduction in per capita disposable income.

Rural resident households are worse off in all cases while the effects of migration flows (along the BP) are compensated by the government policies, along both the EXP-1 and EXP-2. On the other hand, since population decreases along the all paths, per capita disposable income increases. Since employment subsidy induces migration, increase in per capita income along the EXP-2 reaches to 20%, relative to the base-run steady state, while total disposable income slightly declines.

For the rest of households, populations are constant along the all paths. Thus, the magnitudes of changes in per capita and total disposable incomes are exactly the same. Migration inflows from rural areas to urban areas lower disposable incomes of skilled formal wage earners while this effect is partially compensated by increasing government transfers, along the EXP-1. On the other hand, subsidizing firms makes $SF$ slightly better off. The basic determinant of the situations of retirees and transfer receivers is change in GDP, since their sources of incomes are transfers from the government and / or from the SSI. Along the BP (negative) and EXP-2 (positive), changes in disposable income of these two households are the same since GDP declines (increase). On the other hand, $RET$ is worse off along the EXP-1 since gross domestic product declines and their transfer incomes from the SSI decline. However, $TRF$ is strictly better off since government transfers increase by 20%, while its effect is partially offset by decreasing transfers from the SSI.

**Table 5.10: Income Distribution - Relative Results**

| | | Base | BP | EXP-1 | EXP-2 |
|---|---|---|---|---|---|
| **per capita** | **CH** | 1 | 0.9853 | 0.9894 | 0.9989 |
| | **RH** | 1 | 1.1171 | 1.1391 | 1.2070 |
| | **SF** | 1 | 0.9669 | 0.9727 | 1.0151 |
| | **USF** | 1 | 0.9555 | 0.9718 | 0.9713 |
| | **IW** | 1 | 0.9169 | 0.9315 | 0.9057 |
| | **TRF** | 1 | 0.9840 | 1.1175 | 1.0056 |
| | **RET** | 1 | 0.9840 | 0.9846 | 1.0056 |
| **Total** | **CH** | 1 | 0.9853 | 0.9894 | 0.9989 |
| | **RH** | 1 | 0.9824 | 0.9943 | 0.9913 |
| | **SF** | 1 | 0.9669 | 0.9727 | 1.0151 |
| | **USF** | 1 | 0.9954 | 1.0145 | 1.0314 |
| | **IW** | 1 | 1.0974 | 1.1250 | 1.1700 |
| | **TRF** | 1 | 0.9840 | 1.1175 | 1.0056 |
| | **RET** | 1 | 0.9840 | 0.9846 | 1.0056 |
| **RDI (% of total)** | **CH** | 40.86 | 40.79 | 40.54 | 40.51 |
| | **RH** | 32.69 | 32.54 | 32.59 | 32.17 |
| | **SF** | 12.31 | 12.06 | 12.01 | 12.40 |
| | **USF** | 7.34 | 7.41 | 7.47 | 7.52 |
| | **IW** | 3.73 | 4.15 | 4.21 | 4.33 |
| | **TRF** | 1.17 | 1.17 | 1.31 | 1.17 |
| | **RET** | 1.90 | 1.89 | 1.87 | 1.90 |

**Note:** Base stands for the base-run steady state. BP denotes the base-path, while EXP-1 (EXP-2) stand from the experiment paths, respectively. For the definitions of these paths, see the introduction of the Chapter 5.

In the bottom panel, relative disposable incomes, RDI, of households are displayed

$$RDI_t^{hh} = \frac{inc_t^{hh}\, POP_t^{hh}}{\sum_{hh} inc_t^{hh}\, POP_t^{hh}} \tag{5.2}$$

where $inc_t^{hh}$ is per capita disposable income of household $hh$ and $POP_t^{hh}$ is total population. Although there is no population growth, populations of rural households, unskilled formal wage earners, and informal wage earners change due to migration. Thus, changes in $RDI_t^{hh}$ are driven by changes in per capita disposable incomes and changes in populations. RDI measures how total disposable income generated within the economy is distributed among households.

The results reveal that migration flows do not change the distribution of income across households substantially. It seems that the total share of Ricardian households slightly decreases by 47 percentage points which is shared by unskilled formal wage earners and informal wage earners. The shares of retirees and transfer receivers are stable. If migration flows are accompanied with increasing government's unilateral transfers, Ricardian households become worse off, relative to the base-run steady state, whereas non-Ricardian households, except retirees, are better off. Worsening positions of households who hold the majority of the capital in hand and have the administrative positions, emerges in the political economy aspects of

such an increase in the government unilateral transfers. Subsidizing employment also makes Ricardian households' relative positions worse off, except skilled formal wage earners while the effects for capitalists (rural residents) is lower (higher) than those of EXP-1. Along the EXP-2, relative positions of $RET$ and $TRF$ do not change, while $USF$ and $IW$ are strictly better off, by 18 and 60 percentage points, respectively. It should also be noted that the figures in the middle and bottom panels of Table 5.10 can also be classified as "extended" functional income distribution, by following Lofgren et al. (2003).

In order to measure the functional income distribution, the following formula is used

$$FID_t = \frac{\sum_{hh} nwinc_t^{hh} \, POP_t^{hh}}{DISDIV_t} \tag{5.3}$$

where $nwinc_t^{hh}$ is per capita net, after wage tax and soc. sec. premium, wage income of $hh$ and $DISDIV_t$ is total amount of distributed dividends. Since the latter is net-of-corporate tax, net wage income is used.

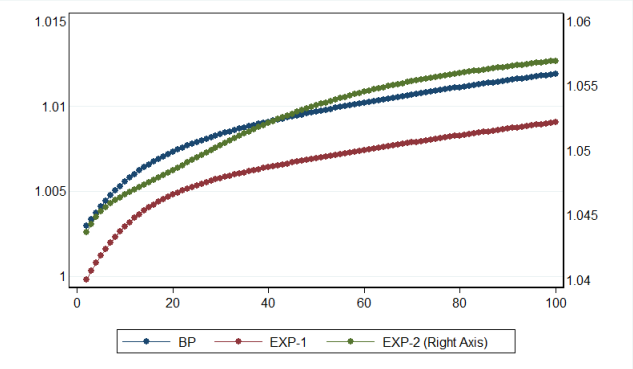



**Figure 5.10: Functional Income Distribution**

The evolution of the functional income distribution is depicted in Figure 5.10 relative to the base-run steady state where the value of $FID$ is set to 1. It seems that along the BP and EXP-1, the $FID$ do not change substantially. On the other hand, wage income increases relatively higher than total distributed dividends and the effect becomes the maximum if employment subsidy policy is applied, by 5.7%.

As mentioned in the Section 3.1, the income distribution can be analyzed either by assigning a distribution function for each group for fixed variances or by calculating new series of in-

comes by applying the growth rates. The studies on the issue reveal that the second approach is superior to the first approach since it is closer to an explicit microsimulation. However, applying crude (nominal or real) growth rates without taking the other demographic or economic changes into account, the results would be misleading. For instance, so-called reweighting approach utilized by Agénor et al. (2004) considers such changes, even they only use the changes in sectoral composition of employment. On the other hand, in this dissertation, there are two major sources of structural change; the composition of population across households and the composition of employment across sectors. Since employing such an analysis is out-of-scope of this dissertation in terms of the methodology, several indicators are provided to introduce the changes in the income distribution.

In order to calculate the indicators, the values of disposable incomes along the experiment paths are required. These values along each path are calculated as follows. The end of horizon results of the CGE model for the growth rates of per capita net wage income (*nwinc*), per capita capital income (*cinc*), per capita transfer incomes (*gtr* and *str*) for each RHG and household-specific prices of composite consumption (*PTC*) are obtained. Then, the end of horizon values of each variable are calculated by using respective growth rates and deflated by household-specific price index, where $PTC^{hh}_{base} = 1 \; \forall \; hh$ is assumed. Since HBS includes private transfers as well, the nominal RHG-level values of these transfers are assumed to be fixed and for each path, these total values are deflated and divided by the respective population figures. After generating all these values, in order to produce the indicators, DASP (Distributive Analysis Stata Package) is used. This package is embedded into the Stata program and allow researchers to produce several poverty and income distribution indicators easily[7].

The basic deficiency of the income distribution analysis via CGE models is that the model can not explore changes in within-group income distribution endogenously. Therefore, rather than assigning a functional form, another way, so-called quantile shares, is utilized to provide within-group changes. In this approach, total population of each RHG is divided into ten deciles and the shares of each decile in total RHG income is computed. Conventionally, the second richest decile's (D9) income share is divided by the poorest's decile's (D1) income share. In Table 5.11, the first column shows the income shares ratio (D9/D1) for each RHG

[7] See the website of the project at `http://dasp.ecn.ulaval.ca/`

along the base-run steady state and the other three columns show percentage changes in the decile ratios along the base-path and the experiment paths, w.r.t the base-run steady state. Along the base-run steady state, the richest decile's income share is more than 8 times of the poorest decile's share for the entire population. Within group income inequality is the highest within capitalists, rural residents, and transfer receivers.

**Table 5.11: The Ratios of Income Shares for the Richest and the Poorest Deciles**

| | Group | Base | BP | EXP-1 | EXP-2 |
|---|---|---|---|---|---|
| **Ricardian** | **CH** | 8.38 | -0.194 | -0.183 | -0.142 |
| | **RH** | 8.34 | -0.473 | -0.061 | -3.441 |
| | **SF** | 5.03 | -0.956 | -0.922 | 0.199 |
| **non-Ricardian** | **USF** | 4.21 | 0.731 | 1.483 | 0.499 |
| | **IW** | 7.31 | 0.327 | -0.356 | 0.278 |
| | **RET** | 4.54 | 0.000 | 0.000 | 0.000 |
| | **TRF** | 8.23 | 1.522 | -4.516 | -1.421 |
| | **Population** | 8.28 | 5.329 | 7.102 | 0.888 |

***Note:*** Base stands for the base-run steady state and the column shows the ratios of decile shares along the base-run steady state. BP, EXP-1 and EXP-2 denote the base-path and the experiment paths, respectively, and the columns show the percentage changes in the decile shares relative to the Base.

The basic reason of changing within-group inequality laid on the following fact. In the micro-level data set provided as a part of HBS, some of households may not get income from each item defined within the CGE model or the share of an income item in total household income may differ. Notice that, each household in HBS is assigned into a unique RHG and then incomes of all households' are aggregated to obtain RHG level income and to conduct calibration, as explained in the Section 4.1 in detail. Let's consider two distinct households within the RHG of $USF$. Both of them are represented by an individual who is working as a formal wage earner and whose educational attainment is high school or less. However, one of these two household may get transfer income from the SSI and the other may not. In this case, changes in the SSI transfer due to a change in GDP would affect these households differently. Moreover, if the share of wage income in total household income is higher for the second household than that of the first household, changes in wage incomes would affect household income at different rates, even the growth rate of wage incomes are equal. Therefore, the figures in Table 5.11 are the outcomes of both the effects of experiments conducted in the CGE model, the compositions of household incomes, and changes in the populations. For instance, since the income of retirees is composed by a unique source, the SSI transfers, and their population is constant along the all paths, the income share ratios and thus within group income inequality do not change.

Along the base-path, the second column, due to the effects of migration, the income shares between the end tails of the distribution narrow for the Ricardian households (the highest for skilled formals) while widen for the non-Ricardian households (the highest for transfer receivers). If migration is accompanied with increasing total government unilateral transfers to households (EXP-1), relative to the base-run steady state, the within-group income inequalities shrink for the Ricardian households. On the contrary, within unskilled formal wage earners, income inequality enlarges while within informal workers and transfer receivers, narrowing income inequalities are observed. If migration is accompanied with employment subsidies, relative to the base-run steady state, within-group inequalities decrease in capitalists and rural residents, while slightly increases within skilled formals. On the contrary, except transfer receivers, income inequality widens within unskilled formal and informal wage earners.

Figure 5.11 depicts the kernel estimates[8] of (log) personal income distributions along the base-path and experiment paths w.r.t. the base-run steady state. These estimates are conducted for the whole population. For each path, the poverty line is calculated endogenously as the economy-wide cost of living value which is calculated as follows. The per capita subsistence consumption expenditures of each commodity for each household have already been obtained in the calibration process. These per capita values for each commodity are multiplied by respective population figures and summed over households and then multiplied by prices of domestic composite commodities ($PQ_{s,t}$) for each path. The sum of these commodity-level subsistence consumption figures yield total value of subsistence consumption. These values show the economy-wide cost of living and chosen as poverty lines. In each case, the poverty line incorporates the effects of changing population and changing prices. For instance, as rural population decline, total value of agricultural subsistence consumption also decline. The vertical lines in Figure 5.11 show these poverty lines. Along the BP and EXP-1, since change in prices are limited, changes in the poverty lines are also limited and they seem almost identical. Conversely, since price changes are relatively bigger along the EXP-2, poverty line shifts to the left, i.e. from the blue line to the red line.

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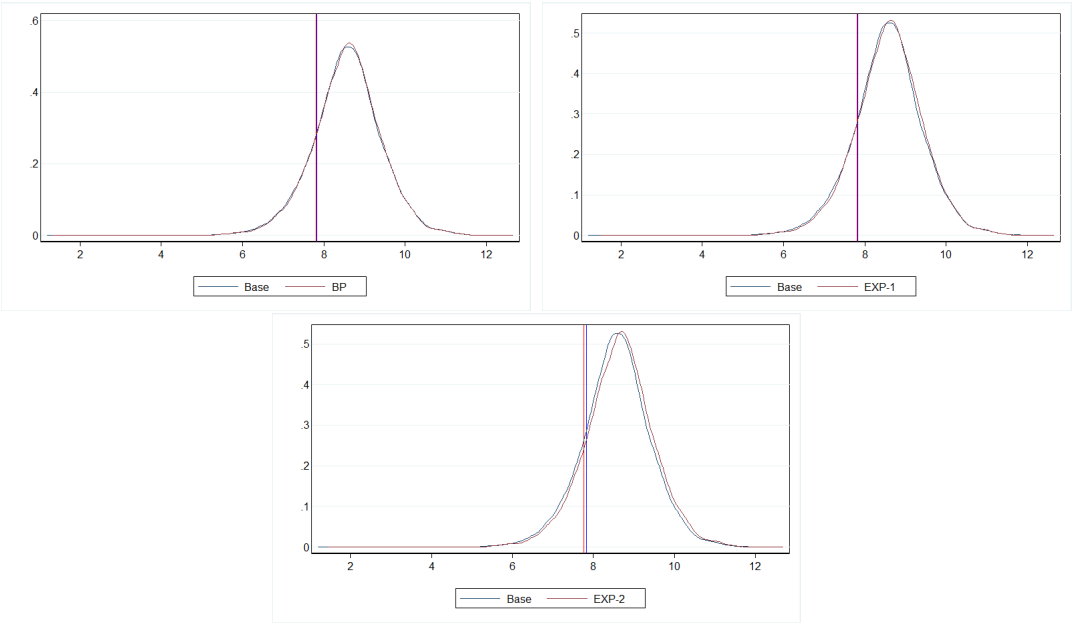
[8] Kernel estimation provides a non-parametric probability distribution function. Kernel estimate is a smoother version of a histogram.




***Note:*** Gaussian kernel estimates of per capita disposable income in natural logarithm. The vertical lines are poverty lines. For definitions, follow the text.

**Figure 5.11: Kernel Density Estimates**

The results reveal that, relative to the base-run steady state, the effects of migration (BP) and migration plus change in the unilateral government transfers to households (EXP-1), are negligible. The probability density functions are almost same. On the other hand, along the EXP-2, i.e. migration plus employment subsidy, mean income of whole population shifts to the right and the poverty line shifts to the left, due to declining prices.

# CHAPTER 6

# CONCLUSION

Turkish welfare regime and its transformation in social security, health system, pension system and welfare assistance programs are at the core of the debate in the last decade. As a major element of the welfare practices, social assistance programs are designed to support individuals who suffer from losses need special attention, since such programs can discourage the recipients from working or erode job search behavior of unemployed individuals. If these effects exist, then the contributions of these payments to obtain better income distribution would be negligible or even zero.

For the Turkish case, the literature reveals that social assistance program payments improve income distribution despite their relatively low shares in total household income. Total amount of welfare assistance payments is too low relative to the gross domestic product and Turkey has one of the lowest ratio among the OECD member states. Thus, the system has been criticized for not being "generous". Moreover, the distribution of these payments among households has also considered to be biased in the sense that the majority of cash payments such as pensions and unemployment benefits are devoted to relatively richer households.

This dissertation focuses on the effects of the public policies on the size distribution of income by utilizing a detailed and comprehensive intertemporal applied general equilibrium model with multiple-households and multiple-firms. The model also incorporates internal migration which is modeled as a variant of Harris and Todaro (1970) to display the demographic change. This demographic change is chosen as a base-path of the economy (labeled as BP) and two experiments are simulated and the results are depicted w.r.t. the base-path. Firstly, an increase in the government transfer expenditures to households by 20% without altering the policy

framework is examined. Secondly, rather than feeding individuals with unilateral aids, the effects of reductions in labor costs via subsidizing sectoral social security contribution rates is simulated. These policy experiments are labeled as EXP-1 and EXP-2, respectively.

The major indicator of an effective public policy that aims to reduce income inequality should be improvement in the size distribution of income. In addition, such policy should not negatively effect labor supply decision of individuals. The demographic change reduces total labor supply where (non-) Ricardian households choose to work (more) less and leads to limited shifts of disposable income from Ricardian households to non-Ricardian households. In the presence of the demographic change, increasing unilateral transfers reduces labor supply of all households and thus, total labor supply, and causes relatively higher shift in the distribution of disposable income in favor of non-Ricardian households. On the other hand, reducing the cost of labor suppresses the negative effects of the demographic change and leads to increasing labor supply of all households. This experiment also leads to the highest changes in the income distribution in favor of non-Ricardian households.

Along each path, informality, the share of informal employment in total employment, increases, while it reaches the highest level along the EXP-2. The are two basic reasons of such an outcome. Firstly, an immigrant is assumed to find a job as an unskilled formal wage earner with 30% probability. Since each policy shock invokes migration, total labor supply of informal workers increases faster than that of unskilled formal wage earners. Secondly, since there is no data on sectoral social security contribution payments by type of workers, the experiment is designed in such a way that unit cost of *composite* labor is reduced which stimulate demand of labor for all types of workers. As it increases, in accordance with the composition of sectoral composite labor input, informality increases.

These findings indicate that the recent policy package is not sufficient to alleviate income inequality even if total government expenditures on social transfers is increased. Decreasing real GDP and discouraging effects on informal workers' labor supply decisions are negative economic consequences. Moreover, worsening position of households who hold the majority of capital implies a political-economy aspect of such a change in the composition government expenditures.

The model economy also allows us to analyze several policy alternatives. For instance, EXP-2

is a part of the employment subsidy program of the government enacted in 2008. In addition to this, the effects of other policy tools such as subsidizing production taxes to reduce total cost of production or lowering corporate tax rate to stimulate investment can also be evaluated. Here, some sectors can be selected or each sector can be subsidized via its share in total exports and / or its share in total investment. In addition to EXP-1, increasing transfers can be accompanied with changing households' shares in total transfers or unilateral transfer framework can be altered via solving the amount of transfer payment as a function of labor supply, i.e. changing the structure into a conditional manner.

As summarized in the Section 3.1, representative agent CGE models have to be supported by a microsimulation modules in order to examine changes in the size distribution of income and poverty more accurately. The results of the experiments conducted in this dissertation can be incorporated into Household Budget Survey for microsimulation analyses. However, applying the results of experiments by ignoring substantial changes in the demographic structure and in the sectoral composition of employment, the results would be misleading. To do so, detailed statistical procedures have to be considered which is out-of-scope of this dissertation in terms of methodology. Conducting microsimulation analyses and the other experiments are subject of future research.

# REFERENCES


Aaberge, R., Colombino, U., Holmøy, E., Strøm, B., & Wennemo, T. (2004). *Population ageing and fiscal sustainability: An integrated micro-macro analysis of required tax changes* (Working Papers, No. 04). Centre for Household, Income, Labour and Demographic Economics (CHILD).

Adelman, I., & Robinson, S. (1988). Macroeconomic Adjustment and Income Distribution. *Journal of Development Economics*, *29*(1), 23-44.

Agénor, P.-R., Chen, D. H. C., & Grimm, M. (2004). *Linking Representative Household Models with Household Surveys for Poverty Analysis: A Comparison of Alternative Methodologies* (Policy Research Working Papers, No. 3343). World Bank.

Agénor, P.-R., Fernandes, R., Haddad, E., & van der Mensbrugghe, D. (2003). *Analyzing the Impact of Adjustment Policies on the Poor: An IMMPA Framework for Brazil* (Mimeo). World Bank.

Agénor, P.-R., Izquierdo, A., & Fofack, H. (2003). *IMMPA: A Quantitative Macroeconomic Framework for the Analysis of Poverty Reduction Strategies* (Policy Research Working Papers, No. 3092). World Bank.

Agénor, P.-R., Jensen, H. T., Verghis, M., & Yeldan, E. (2006). *Disinflation, Fiscal Sustainability, and Labor Market Adjustment in Turkey* (Policy Research Working Paper, No. 3804). World Bank.

Aiginger, K. (2002). *The New European Model of the Reformed Welfare State (NEM-RWS)* (Working Paper, No. 2). European Forum.

Aiginger, K., Guger, A., Leoni, T., & Walterskirchen, E. (2007). *Reform Perspectives on Welfare State Models in Global Capitalism* (Working Papers, No. 303). The Austrian Institute of Economic Research (WIFO).

Aile ve Sosyal Politikalar Bakanlığı - (Ministry of Family and Social Policies). (2013). *Annual Report.*

Aile ve Sosyal Politikalar Bakanlığı - (Ministry of Family and Social Policies). (2014). *Annual Report.*

Aile ve Sosyal Politikalar Bakanlığı - (Ministry of Family and Social Policies). (2015). *Annual Report.*

Andersen, T. M., & Svarer, M. (2007). Flexicurity—labour market performance in Denmark.

*CESifo Economic Studies*, *53*(3), 389–429.

Annabi, N., Cisse, F., Cockburn, J., & Decaluwé, B. (2005). *Trade Liberalisation, Growth and Poverty in Senegal: a Dynamic Microsimulation CGE Model Analysis* (Working Paper, No. 7). CEPII Research Center.

Aybars, A. İ., & Tsarouhas, D. (2010). Straddling two continents: Social policy and welfare politics in Turkey. *Social Policy & Administration*, *44*(6), 746-63.

Aydın, H. İ., Kaplan, C., Kesriyeli, M., Özmen, E., Yalçın, C., & Yiğit, S. (2006). *Corporate Sector Financial Structure in Turkey: A Descriptive Analysis* (Working Papers, No. 0607). Research and Monetary Policy Department, Central Bank of the Republic of Turkey.

Bahçe, S., & Köse, A. H. (2014). *The Effects of the New Welfare System on the Inter- and Intra-Class Distribution of Income in Turkey.* Retrieved (16.02.2016), from `http://goo.gl/vNiG4H`

Balaban, U. (2014). Türkiye ve Avrupa Birliği'nde Sosyal İçerme Uygulamaları: 2000'li Yıllara İlişkin Karşılaştırmalı Bir Değerlendirme (Social Inclusion Practices in Turkey and the European Union in the 2000s: A Comparative Assessment), (in Turkish). *Mülkiye Dergisi*, *38*(1), 103-49.

Balkan, B., Başkaya, Y. S., & Tümen, S. (2016). *Evaluating the Impact of the Post-2008 Employment Subsidy Program in Turkey* (Discussion Paper, No. 9993). Institute for Labor Studies (IZA).

Bartlett, W. (1983). On the dynamic instability of induced-migration unemployment in a dual economy. *Journal of Development Economics*, *13*(1), 85-96.

Başlevent, C. (2014). Social Transfers and Income Inequality in Turkey: How Informative is the Survey of Income and Living Conditions? *Ekonomi-tek*, *3*(3), 23-42.

Begg, I., Mushövel, F., & Niblett, R. (2015). *The Welfare State in Europe: Visions for Reform* [Chatham House Europe Programme, Research Paper].

Bertelsmann Stiftung. (2016). *BTI 2016 - Turkey Country Report.*

Boccanfuso, D., Decaluwé, B., & Savard, L. (2008). Poverty, income distribution and CGE micro-simulation modeling: Does the functional form of distribution matter? *Journal of Economic Inequality*, *6*(2), 149-84.

Boccanfuso, D., & Savard, L. (2012). A Segmented Labour Supply Model Estimation for the Construction of a CGE Microsimulation Model: An Application to the Philippines. *The Journal of Applied Economic Research*, *6*(2), 211-34.

Boeters, S., & Savard, L. (2011). *The Labour Market in CGE Models* (CPB Discussion Paper, No. 201). CPB Netherlands Bureau for Economic Policy Analysis.

Boratav, K., & Yeldan, E. (2001). *Turkey, 1980-2000: Financial Liberalization, Macroeconomic (In)-Stability and Patterns of Distribution* [Mimeo].

Boratav, K., Yeldan, E., & Köse, A. H. (2000). *Globalization, Distribution and Social Policy: Turkey, 1980-1998* (Working Papers, No. 20). Center for Economic Policy Analysis.

Bourguignon, F., Robilliard, A.-S., & Robinson, S. (2003). *Representative versus real households in the macro-economic modeling of inequality* (Working Papers, No. 10). Développement, Institutions et Mondialisation (DIAL).

Bourguignon, F., & Spadaro, A. (2006). Microsimulation as a tool for evaluating redistribution policies. *The Journal of Economic Inequality*, *4*(1), 77-106.

Bridgen, P. (2006). A Straitjacket with Wriggle Room: The Beveridge Report, the Treasury and the Exchequer's Pension Liability, 1942–59. *Twentieth Century British History*, *17*(1), 1-25.

Buffie, E. F., & Atolia, M. (2012). Trade, Growth, and Poverty in Zambia: Insights from a Dynamic GE Model. *Journal of Policy Modeling*, *34*(2), 211-29.

Buğra, A., & Adar, S. (2007). *An Analysis of Social Policy Expenditures in Turkey in a Comparative Perspective.* Retrieved (23.02.2016), from `http://goo.gl/LUY5K0`

Buğra, A., & Keyder, Ç. (2003). *New Poverty and The Changing Welfare Regime of Turkey* [Report prepared for the United Nations Development Programme].

Buğra, A., & Keyder, Ç. (2005a). *Poverty and Social Policy in Contemporary Turkey* [Boğaziçi University Social Policy Forum, Working Paper].

Buğra, A., & Keyder, Ç. (2005b). Sosyal Politika Nedir? - What is Social Policy? (in Turkish). *İktisat İşletme ve Finans*, *20*(227), 5-33.

Bülbül, S., & Köse, A. (2010). Türkiye'de Bölgelerarası İç Göç Hareketlerinin Çok Boyutlu Ölçekleme Yöntemi ile İncelenmesi (Examining Between Regional Internal Migration Movements in Turkey with Multidimensional Scaling, (in Turkish)). *İstanbul Üniversitesi İşletme Fakültesi Dergisi - Istanbul University Journal of the School of Business Administration*, *39*(1), 75-94.

Calvo, G. A. (1975). Urban Unemployment and Wage Determination in LDC'S: Trade Unions in the Harris-Todaro Model. *International Economic Review*, *19*(1), 65-81.

Cicowiez, M., Alejo, J., Gresia, L. D., Olivieri, S., & Pacheco, A. (2016). Export Taxes, World Prices, and Poverty in Argentina: A Dynamic CGE-Microsimulation Analysis. *International Journal of Microsimulation*, *9*(1), 24-54.

Cloutier, M.-H., Cockburn, J., & Decaluwé, B. (2008). *Education and Poverty in Vietnam: a Computable General Equilibrium Analysis* (Working Paper, No. 08-04). Inter-University Centre on Risk, Economic Policies, and Employment (CIRPÉE).

Coady, D. P., & Harris, R. L. (2001). *A regional general equilibrium analysis of the welfare impact of cash transfers* (TMD Discussion Paper, No. 76). International Food Policy Research Institute (IFPRI).

Cockburn, J. (2002). *Trade Liberalisation and Poverty in Nepal: A Computable General Equilibrium Micro Simulation Analysis* (Working Paper, No. 11). Centre for the Study of African Economies (CSAE).

Cockburn, J., Fofana, I., Decaluwe, B., Mabugu, R., & Chitiga, M. (2007). A gender-focused Macro-Micro analysis of the poverty impacts of trade liberalization in South Africa. In P. J. Lambert (Ed.), *Equity (Research on Economic Inequality, Volume 15)* (p. 269–305). Emerald Group Publishing.

Cogneau, D., & Robilliard, A.-S. (2000). *Growth, Distribution and Poverty in Madagascar: Learning from a Microsimulation Model in a General Equilibrium Framework* (Discussion Paper Series, No. 61). IFPRI TMD.

Cole, W. E., & Sanders, R. D. (1985). Internal Migration and Urban Employment in the Third World. *The American Economic Review*, *75*(3), 481-94.

Cororaton, C. B., & Corong, E. L. (2009). *Philippine Agricultural and Food Policies Implications for Poverty and Income Distribution* (Research Report, No. 161). International Food Policy Research Institute (IFPRI).

Coşar, E. E. (2016). *Firmaların Sabit Sermaye Yatırım Kararlarının Analizi: Türkiye İmalat Sanayine Dair Bulgular (The Analysis of Fixed Capital Investment Decisions of Firms: Evidence from Turkish Manufacturing Industry), (in Turkish)* (Working Papers, No. 1616). Research and Monetary Policy Department, Central Bank of the Republic of Turkey.

Cretegny, L., & Rutherford, T. F. (2004). *Worked examples in dynamic optimization: Analytic and numeric methods.* Retrieved (03.08.2016), from `http://goo.gl/dgcNTv`

Cury, S., Pedrozo, E., & Coelho, A. M. (2016). Cash Transfer Policies, Taxation and the Fall in Inequality in Brazil An Integrated Microsimulation-CGE Analysis. *International Journal of Microsimulation*, *9*(1), 55-85.

Davies, J. B. (2009). Combining microsimulation with CGE and macro modelling for distributional analysis in developing and transition countries. *International Journal of Microsimulation*, *2*(1), 49-56.

Decaluwé, B., Dumont, J.-C., & Savard, L. (1999). *Measuring Poverty and Inequality in a Computable General Equilibrium Model* (Working Paper, No. 99-20). Université Laval - Département d'économique.

Decaluwé, B., Lemelin, A., Robichaud, V., & Maisonnave, H. (2013). *the PEP standard single-country, recursive dynamic CGE model* (Technical Document). Partnership for Economic Policy (PEP).

Decaluwé, B., Patry, A., Savard, L., & Thorbecke, E. (1999). *Poverty Analysis Within a General Equilibrium Framework* (Working Paper, No. 99-09). University of Laval Department of Economics.

Değer, Ç. (2011). *An Overlapping Generations Analysis of Social Security Reform in Turkey* (Ph.D. Thesis). Middle East Technical University, Department of Economics.

de Janvry, A., Sadoulet, E., & Fargeix, A. (1991). Politically Feasible and Equitable Adjustment: Some alternatives for Ecuador. *World Development*, *19*(11), 1577-94.

Demery, L., & Demery, D. (1991). Poverty and macroeconomic policy in Malaysia, 1979–1987. *World Development*, *19*(11), 1615-32.

de Quatrebarbes, C., Boccanfuso, D., & Savard, L. (2016). Beyond representative households: The macro–micro impact analysis of VAT designs applied to Niger. *Economic Modelling*, *57*(September), 76-92.

Derviş, K., de Melo, J., & Robinson, S. (1982). *General Equilibrium Models for Development Policy*. Cambridge University Press: New York.

de Santis, R. A. (2000). The Impact of a Customs Union with the EU on Turkey's Welfare, Employment and Income Distribution: An AGE Model with Alternative Labour Market Structures. *Journal of Economic Integration*, *15*(2), 195-238.

de Santis, R. A. (2003). The Impact of a Customs Union with the Europen Union on Internal Migration in Turkey. *Journal of Regional Science*, *43*(2), 349-72.

Dissou, Y., & Didic, S. (2011). *Public Infrastructure and Economic Growth: A Dynamic General Equilibrium Analysis with Heterogeneous Agents* [Mimeo]. Retrieved (16.02.2015), from `goo.gl/GjuleY`

Erten, H. (2009). *Türkiye için Sektörel SHM Üretme Yöntemi ve İstihdam Üzerine Bir HGD Modeli Uygulaması (Sectoral Social Accounting Matrix Construction Methodology and an Employment Based Computable General Equilibrium Model Application for Turkey), (in Turkish)* (Planning Expertise Thesis, No. 2805). Ministry of Development (Former State Planning Organization).

Esping-Andersen, G. (1990). *The three worlds of welfare capitalism*. Princeton University Press.

Esping-Andersen, G. (1999). *Social Foundations of Postindustrial Economies*. Oxford University Press.

Fehr, H. (2009). Computable Stochastic Equilibrium Models and Their Use in Pension- and Ageing Research. *De Economist*, *157*(4), 359-416.

Fehr, H. (2016). CGE modeling social security reforms. *Journal of Policy Modeling*, *38*(3), 475-94.

Ferreira Filho, J. B. d. S., & Horridge, M. J. (2006). Economic integration, poverty and regional inequality in Brazil. *Revista Brasileira de Economia*, *60*(4), 363-87.

Fields, G. S. (2005). *A guide to multisector labor market models* (Social Protection Discussion Paper Series, No. 32547). The World Bank.

Filiztekin, A. (2015). Income Inequality Trends in Turkey. *İktisat İşletme ve Finans*, *30*(350), 63-92.

Fok, Y. K., & McVicar, D. (2012). *Did the 2007 Welfare Reforms for Low Income Parents in Australia Increase Welfare Exits?* (Working Paper, No. 01). Melbourne Institute.

Galí, J., López-Salido, J., & Vallés, J. (2004). Rule-of-Thumb Consumers and the Design of Interest Rate Rules. *Journal of Money, Credit, and Banking*, *36*(4), 739-64.

Genç İleri, Ş. (2015). *Selective Immigration Policy and Its Impacts on Natives: A General Equilibrium Analysis* (Working Papers, No. 1529). Research and Monetary Policy Department, Central Bank of the Republic of Turkey.

Gök, B. (2012). *Vergi Politikası Değişikliklerinin Ekonomik Etkileri: Uygulamalı Genel Denge Analizi (The Economic Effects of Tax Policy Changes: An Applied General Equilibrium Approach, (in Turkish)* (Ph.D. Thesis). Ege University, Department of Economics.

Grütjen, D. (2008). The Turkish welfare regime: An example of the Southern European model? The role of the state, market and family in welfare provision. *Turkish Policy Quarterly*, *7*(1), 111-29.

Güneş, Ş. (2007). Functional Income Distribution in Turkey: A Cointegration and VECM Analysis. *Journal of Economic and Social Research*, *9*(2), 23-36.

Gürsel, S., Levent, H., Selim, R., & Özlem Sarıca. (2000). *Türkiye'de Bireysel Gelir Dağılımı ve Yoksulluk: Avrupa Birliği ile Karşılaştırma (Personal Income Distribution and Poverty in Turkey: A Comparison with European Union), (in Turkish)* (Tech. Rep. No. 2000-12/295). TÜSİAD.

Güven, A., Dalgıç, B., & Tansel, A. (2014). *Gelir Hareketliliği Eşitsizlikleri Azaltabilir mi? Türkiye Örnegi (Can Income Mobility Reduce Income Inequality? Evidence From Turkey), (in Turkish)* (ERC Working Papers, No. 1407). ERC - Economic Research Center, Middle East Technical University.

Harris, J. R., & Todaro, M. P. (1970). Migration, Unemployment & Development: A Two-Sector Analysis. *American Economic Review*, *60*(1), 126-42.

Harrison, G. W., Rutherford, T. F., & Tarr, D. G. (2003). Trade liberalization, poverty and efficient equity. *Journal of Development Economics*, *71*(1), 97 - 128.

Hayashi, F. (1982). Tobin's Marginal q and Average q: A Neoclassical Interpretation. *Econo-*

*metrica*, *50*(1), 213-24.

Heckman, J. J., Lochner, L., & Taber, C. (1998). Explaining Rising Wage Inequality: Explorations with a Dynamic General Equilibrium Model of Labor Earnings with Heterogeneous Agents. *Review of Economic Dynamics*, *1*(1), 1-58.

Hone, T., Gurol-Urganci, I., Millett, C., Başara, B., Akdağ, R., & Atun, R. (2016). Effect of primary health care reforms in turkey on health service utilization and user satisfaction. *Health Policy and Planning*. doi: 10.1093/heapol/czw098

Hoopengardner, T. (1974). *Rural-Urban Migration in Less Developed Countries: A Dynamic View* (Discussion Paper, No. 33). Center for Research on Economic Development - The University of Michigan.

Jung, H.-S., & Thorbecke, E. (2003). The Impact of Public Education Expenditure on Human Capital, Growth and Poverty in Tanzania and Zambia: a General Equilibrium Approach. *Journal of Policy Modeling*, *25*(8), 701-25.

Karadağ, M. (1997). *The Effects of VAT Harmonization with the EU on the Turkish Economy: A CGE Approach* (Ph.D. Thesis). Loughborough University, Department of Economics.

Karamessini, M. (2007). *The Southern European Social Model: Changes and Continuities in Recent Decades* (Discussion Paper, No. 174). International Institute for Labour Studies.

Kaushal, N., & Kaestner, R. (2001). From Welfare to Work: Has Welfare Reform Worked? *Journal of Policy Analysis and Management*, *20*(4), 699-719.

Kinnunen, J., Tamminen, S., & Jussila, M. (2012). *The estimation of LES demand elasticities for CGE models* (Working Paper, No. 39). Government Institute for Economic Research Finland (VATT).

Kitschelt, H. (2015). Social Policy, Democratic Linkages, and Political Governance. Presented in the conference of The Quality of Government and the Performance of Democracies, Gothenburg, May 20-22, 2015. Retrieved (09.03.2016), from `http://goo.gl/jAg9IQ`

Köksal, B., & Orman, C. (2015). *Determinants of Capital Structure: Evidence from a Major Developing Economy* (Working Papers, No. 1426). Research and Monetary Policy Department, Central Bank of the Republic of Turkey.

Lambert, S., Schneider, H., & Suwa, A. (1991). Adjustment and equity in Côte d'Ivoire: 1980–86. *World Development*, *19*(11), 1563-76.

Latorre, M. C. (2016). A CGE Analysis of the Impact of Foreign Direct Investment and Tariff Reform on Female and Male Workers in Tanzania. *World Development*, *77*(1), 346-66.

Lofgren, H., Robinson, S., & El-Said, M. (2003). Poverty and Inequality Analysis in a General Equilibrium Framework: The Representative Household Approach. In F. Bourguignon & L. A. P. da Silva (Eds.), *The Impact of Economic Policies on Poverty and Income Distribution: Evaluation Techniques and Tools (Equity and development)* (p. 325-37). World Bank Publications.

Lorentzen, T., & Dahl, E. (2005). Active Labour Market Programmes in Norway: Are They Helpful for Social Assistance Recipients? *Journal of European Social Policy*, *15*(1), 27-45.

Marí-Klose, P., & Moreno-Fuentes, F. J. (2013). The Southern European Welfare model in the post-industrial order. *European Societies*, *15*(4), 475-92.

Meller, P. (1991). Adjustment and social costs in Chile during the 1980s. *World Development*, *19*(11), 1545-61.

Metin, B. (2012). Yoksullukla Mücadelede Asgari Gelir Güvencesi: Türkiye'de Sosyal Yardım ve Hizmet Sisteminde Mevcut Durum Asgari Gelir Güvencesi İhtiyacı (Minimum Income Guarantee to Straggle Against Poverty: Social Benefits and Services System in Turkey and the Need For Minimum Income Guarantee), (in Turkish). *Sosyal Güvenlik Dergisi*, *2*(1), 117-51.

Moffitt, R. (1983). An Economic Model of Welfare Stigma. *The American Economic Review*, *73*(5), 1023-1035.

Moreira, E. P., & Bayraktar, N. (2008). Foreign aid, growth and poverty: A policy framework for Niger. *Journal of Policy Modeling*, *30*(3), 523-39.

Morrisson, C. (1991). Adjustment, incomes and poverty in Morocco. *World Development*, *19*(11), 1633-51.

Musgrove, P. (2000). Health insurance: the influence of the Beveridge Report. *Bulletin of the World Health Organization*, *78*(6), 845-46.

Neugart, M. (2007). *Provisions of the welfare state: employment protection versus unemployment insurance* (Economic Papers, No. 279). Directorate General Economic and Monetary Affairs (DG ECFIN), European Commission.

OECD. (2014). *Social Expenditure Update.* Retrieved (03.04.2016), from `http://goo.gl/Bs6DVr`

Orman, C., & Köksal, B. (2015). *Structure of Debt Maturity across Firm Types* (Working Papers, No. 1521). Research and Monetary Policy Department, Central Bank of the Republic of Turkey.

Özmen, E., & Yalçın, C. (2007). Küresel Finansal Riskler Karşısında Türkiye'de Reel Sektör Finansal Yapısı ve Borç Dolarizasyonu (Corporate Sector's Financial Structure and Liability Dolarization in Turkey in view of Global Financial Risks, (in Turkish)). *İktisat*

*İşletme ve Finans*, *22*(258), 5-39.

Özmucur, S. (1996). Yeni Milli Gelir Serisi ve Gelirin Fonksiyonel Dağılımı, 1968-1994 (The New GDP Series and the Functional Income Distribution in Turkey, 1968-1994), (in Turkish). *METU Studies in Development*, *23*(1), 85-127.

Robinson, S. (1989). Multisectoral models. In H. Chenery & T. Srinivasan (Eds.), *Handbook of Development Economics* (Vol. 2, p. 885-947). Elsevier.

Savard, L. (2003). *Poverty and Income Distribution in a CGE-Household Micro-Simulation Model: Top-Down/Bottom Up Approach* (Working Paper, No. 03-43). Inter-University Centre on Risk, Economic Policies, and Employment (CIRPÉE).

Şeker, S. D. (2011). *The Dynamics of Poverty in Turkey* (Ph.D. Thesis). Middle East Technical University, Department of Economics.

Şeker, S. D., & Dayıoğlu, M. (2015). Poverty Dynamics in Turkey. *Review of Income and Wealth*, *61*(3), 477-93.

Şeker, S. D., & Dayıoğlu, M. (2016). The effect of the global financial crisis on household income, inequality and poverty in Turkey. *METU Studies in Development*, *43*(1), 361-90.

Şeker, S. D., & Jenkins, S. P. (2015). Poverty Trends in Turkey. *The Journal of Economic Inequality*, *13*(3), 401-24.

Selim, R., & Şenesen, Ü. (1999). Gelir Vergisinin 1960'dan sonra Türkiye Kişisel Gelir Dağılımı Üzerine Etkisi (The Effects of Income Tax on Personal Income Distribution in Turkey since 1960), (in Turkish). *İktisat İşletme ve Finans*, *14*(158), 30-8.

Şenses, F. (1999). Yoksullukla Mücadele ve Sosyal Yardımlaşma ve Dayanışmayı Teşvik Fonu (The Fight AGainst Poverty and the Encouragement of the Social Assistance and Solidarity Fund), (in Turkish). *METU Studies in Development*, *26*(3-4), 427-51.

Şenses, F. (2010). *Income Distribution, Labor Markets and Poverty: The Intersecting and Most Challenging Issues under Neoliberal Globalization* [Mimeo].

Smith, P. C., & Yip, W. (2016). The economics of health system design. *Oxford Review of Economic Policy*, *32*(1), 21-40.

Springer, K. (1998). Climate policy and trade: Modeling dynamics in a multi-regional framework. In *Conference «using dynamic computable general equilibrium models for policy analysis* (pp. 14–17).

Steger, T. M. (2000). Economic growth with subsistence consumption. *Journal of Development Economics*, *62*(2), 343-61.

Tanton, R., Williamson, P., & Harding, A. (2014). Comparing Two Methods of Reweighting a

Survey File to Small Area Data. *International Journal of Microsimulation*, *7*(1), 76-99.

Thorbecke, E. (1991). Adjustment, Growth and Income Distribution in Indonesia. *World Development*, *19*(11), 1595-1614.

Togan, S. (1983). Effects of Alternative Policy Regimes on Foreign-Payments Imbalancesh. *The Pakistan Development Review*, *22*(4), 239-60.

Türkiye İş Kurumu (Turkish Labor Agency). (2015). *Annual Report.*

*Türkiye Göç ve Yerinden Olmuş Nüfus Araştırması - TGYONA (Turkey Migration and Displaced Population Research), (in Turkish)*. (2006). Nüfus Etütleri Enstitüsü, Hacettepe Üniversitesi.

Üçkardeşler, E. (2015). Turkey's Changing Social Policy Landscape. *Turkish Policy Quarterly*, *13*(4), 149-61.

Ünveren, B., & Sunal, S. (2015). Why is the Labor Share so Low in Turkey? *The Developing Economies*, *53*(4), 272-88.

van Tongeren, F. (1998). Microsimulation of Corporate Response to Investment Subsidies. *Journal of Policy Modeling*, *20*(1), 55-75.

Vidyattama, Y., Rao, M., Mohanty, I., & Tanton, R. (2014). Modelling the impact of declining Australian terms of trade on the spatial distribution of income. *International Journal of Microsimulation*, *7*(1), 100-26.

Voyvoda, E., & Yeldan, E. (2005). Managing Turkish debt: An OLG investigation of the IMF's fiscal programming model for Turkey. *Journal of Policy Modeling*, *27*(6), 743-65.

Woods, D. R., Chadwick, L., & Volkert, J. (2002). Financial Incentives within Social Assistance: Comparing Current Strategies in the U.S. and Germany. *German Policy Studies*, *2*(1), 72-104.

World Bank. (2014). *Turkey's Transition: Integration, Inclusion, Institutions.*

Yakut, A. M. (2015). Labor Supply and Welfare Benefits in Turkey. *İktisat İşletme ve Finans*, *30*(347), 9-36.

Yakut-Çakar, B., Erus, B., & Adaman, F. (2012). An inquiry on Introducing a Minimum Income Scheme in Turkey: Alternating between Cost Efficiency and Poverty Reduction. *Journal of European Social Policy*, *22*(3), 305-18.

Yeldan, E. (2015). *Turkey's Employment Subsidy Programme under Great Recession: A General Equilibrium Assessment* [Mimeo].

Yeldan, E., Taşçı, K., Voyvoda, E., & Özsan, E. (2013). *Orta Gelir Tuzağı'ndan Çıkış:*

*Hangi Türkiye, Bölgesel Kalkınma ve İkili Tuzaktan Çıkış Stratejileri, Cilt II (Breaking the middle-income trap: which Turkey, Regional development and strategies for breaking the double trap, Vol 2.), (in Turkish)* (Report,). Turkish Enterprise and Business Confederation (TURKONFED).

Yeldan, E., Özsan, M. E., & Taşçı, K. (2012). Türkiye'de İstihdam-Büyüme İlişkisi Üzerine Bölgesel Hesaplanabilir Genel Denge Modeli Uygulaması (A Regional Computable General Equilibrium Model Application to Employment-Growth Relation in Turkey), (in Turkish). *Çalışma ve Toplum*, *32*(1), 11-50.

Yentürk, N. (2013). Türkiye'de Yoksullara Yönelik Harcamalar (Public expenditures for the poor in Turkey), (in Turkish). *METU Studies in Development*, *40*(2), 433-64.

Yükseler, Z. (2005). 1994, 2002 ve 2003 Yılları Hanehalkı Gelir ve Tüketim Anketleri: Anket Sonuçlarına Farklı Bir Bakış (Household Income and Consumption Expenditures in 1994-2003 Surveys: A Different Approach to Interpreting The Results), (in Turkish). *İktisat İşletme ve Finans*, *20*(230), 56-82.

Yükseler, Z., & Türkan, E. (2008). *Türkiye'de Hanehalkı: İşgücü, Gelir, Harcama ve Yoksulluk Açısından Analizi (Households in Turkey: Analyses of Labor Force, Income, Expenditure and Poverty), (in Turkish)* (Tech. Rep. No. 2000-03/455). TÜSİAD.

# APPENDIX A

# LIST OF VARIABLES

**Endogenous Variables**

| | | | | | |
|---|---|---|---|---|---|
| **Households** | $tc_{hh,t}$ | Per capita composite consumption | **Government & Social Security Institution** | $GOVREV_t$ | Government revenues |
| | $ls_{hh,t}$ | Per capita composite labor supply | | $GOVCON_t$ | Total government consumption |
| | $sls_{s,hh,t}$ | per capita sectoral labor supply | | $GTRHH_t$ | Transfer payments of government to households |
| | $cinc_{hh,t}$ | Per capita capital/asset income | | $CG_{s,t}$ | Government consumption demand |
| | $winc_{hh,t}$ | Per capita gross wage income | | $TARIFS_{s,t}$ | Tariff Revenues |
| | $inc_{hh,t}$ | Per capita disposable income | | $VATREV_{s,t}$ | Value added tax revenues |
| | $wtax_{hh,t}$ | Per capita wage tax payments | | $PRODTAXS_{s,t}$ | Taxes on production |
| | $ssppay_{hh,t}$ | Per capita social security premium payments | | $CORPTAXS_t$ | Corporate tax revenues |
| | $sav_{hh,t}$ | Per capita savings | | $GFDS_t$ | Government foreign debt stock |
| | $cd_{g,hh,t}$ | Per capita consumption | | $GFINT_t$ | Interest payments of government on GFDS |
| | $gtr_{hh,t}$ | Per capita transfer receipt from the government | | $SSTRHH_t$ | Transfer payments of SSI to households |
| | $str_{hh,t}$ | Per capita transfer receipt from the SSI | | $SSDEF_t$ | SSI deficits |
| | $rnw_{hh,t}$ | Real net wage | **Quantities** | $QE_{s,t}$ | Exports |
| | $POP_{hh,t}$ | Population | | $QM_{s,t}$ | Imports |
| | $LSUP_{hh,t}$ | Total labor supply | | $QS_{s,t}$ | Composite domestic supply |
| **Prices** | $PTC_{hh,t}$ | Price of composite consumption | | $QD_{s,t}$ | Domestic supply of domestically produced commodities |
| | $PVA_{s,t}$ | Sectoral price of value added | | $GDP_t$ | Gross domestic product |
| | $PI_t$ | Investment price | | $TRBAL_t$ | Trade Balance (Net Exports) |
| | $WK_{s,t}$ | Sectoral price of capital | | $TOTPRSAV_t$ | Total private savings |
| | $PX_{s,t}$ | Price of Output | | $TOTPRCON_{s,t}$ | Total private consumption |
| | $PM_{s,t}$ | Import price in domestic currency | | $QDD_{s,t}$ | Total domestic demand |
| | $PE_{s,t}$ | Export price in domestic currency | | $QINT_{s,t}$ | Total intermediate input demand |
| | $PQ_{s,t}$ | Price of composite domestic commodity | | $MIG_t$ | Migration |
| | $PD_{s,t}$ | Price of domestically produced commodities | **Firms & Production** | $DIV_{s,t}$ | Sectoral dividends |
| | $CW_{s,t}$ | Sectoral composite wage | | $I_{s,t}$ | Sectoral physical investment |
| | $w_{hh,t}$ | Composite wage | | $ADJ_{s,t}$ | Sectoral adjustment cost |
| | $sw_{s,hh,t}$ | Sectoral wage | | $INV_{s,t}$ | Sectoral investment expenditures, including Adjustment Cost |
| | $tobin_{s,t}$ | Shadow price of sectoral capital stock | | $K_{s,t}$ | Sectoral capital stock |
| | $rnwd_t$ | Real net wage differential | | $XS_{s,t}$ | Sectoral output |
| | | | | $INT_{sf,s,t}$ | Sectoral intermediate input demand |
| | | | | $VA_{s,t}$ | Sectoral value added |
| | | | | $CLD_{s,t}$ | Sectoral composite labor demand |
| | | | | $LD_{s,hh,t}$ | Sectoral labor demand |
| | | | | $SSCONT_{s,t}$ | Sectoral social security contribution payments |
| | | | | $DISDIV_t$ | Total distributed dividends |

**Exogenous & Fixed Variables**

| | | | | |
|---|---|---|---|---|
| | $ER_t$ | Nominal exchange rate | $PINDEX_t$ | Price Index (CPI) |
| | $GTRENT_t$ | Transfer payments of government to enterprises | | |

# APPENDIX B

# DETAILS OF THE LITERATURE SURVEY

**Table B.1: Representative Agent CGE Models**

| Study | Country | Model Details | Experiments & Results |
|---|---|---|---|
| Togan (1983) | Turkey | Static multisectoral model is used to analyze the effects of permanent decline in the foreign savings inflow. In the inward-oriented policy, foreign exchange shortage is eliminated via rationing at fixed exchange rate. In the outward-oriented policy, excess demands in all markets are eliminated via flexible prices. | Under three different export- and import-elasticities, the functional income distribution changes in favor of capital income but the effect is remarkably higher if the inward-oriented policies are applied. |
| Thorbecke (1991) | Indonesia | RA-CGE model comprises real side (with four labor and five capital categories, 14 sectors and detailed government expenditures) and financial side (includes commercial banks, the central bank with 6 types of assets). | Simulates budget cuts (equiproportional or selective), accelerated depreciation of the domestic currency, and changes in the money supply. The government's program is superior to proposed policy packages. |
| Karadağ (1997) | Turkey | Static open economy CGE model comprises 20 production sectors and six RHGs that are differentiated by area of residence and income. | Revenue-neutral harmonization of VAT rates via income tax rates adjustment reveal that household income and disposable income increase but changes in the latter are greater due to declining income tax rates. In terms of equivalent variation, all RHGs but urban-rich are worse off as prices go up. |
| de Santis (2000) | Turkey | Static RA-CGE model incorporates 20 sector, one type of capital, eight types of labor and 39 RHGs. The labor market is modeled in three different ways; full employment, unemployment with fixed real wages of skilled workers and by utilizing wage curve approach. | Turkey's accession to Customs Union leads to growth in the major exportable commodities although protections are eliminated. General entropy indices show that intra- and inter-group income inequalities decline under flexible and fixed wages, while intra- (inter-) group inequalities decline slightly (increase) when wage curve is used. |
| Harrison et al. (2003) | Turkey | Households are differentiated by area of residence and level of household income, 40 households in total. Static model constitutes eight types of labor (perfectly mobile within its own type), two types of capital, 54 sectors. | Compensating welfare loses of poor households via Pareto-type *sidepayments* do not lead to Pareto improvements. Keeping protection in selected sectors, would reduce the negative consequences of the Customs Union. |

| | | | |
|---|---|---|---|
| Voyvoda and Yeldan (2005) | Turkey | An analysis of the IMF-designed stand-by agreement implemented after the economic crisis of 2001. The major aim of the program was reducing the public indebtedness via holding primary surplus which was targeted by 6.5% of the GNP under the assumption of 5% annual growth rate between 2003 and 2006. They use an open economy overlapping generations CGE framework. | The program is used as a benchmark case and the effects of different growth rates are examined. Functional income distribution (wage income over profit income) improves (deteriorates) if the growth rate of GNP is below (above) of the program's projection. |
| Agénor et al. (2006) | Turkey | It is an application of IMMPA model. Although the original model incorporates a microsimulation analysis, this study do not employ it. | Increasing VAT rates of private formal sectors' commodities lead to worsening urban-rural income differential against rural households while capitalist-rentiers are worse off among rural households. Increasing income tax rates for profit earners makes rural resident and capitalist-rentier households worse off while informal and formal wage earners in the urban are better off, relative to the urban average. |
| Cloutier et al. (2008) | Vietnam | In a static RA-CGE analysis, education expenditures are treated as "investment" into skill acquisition process. Relative supply of skilled and unskilled labor and their wage rate is solved within the model as a function of the level of schooling, multiple RHGs are differentiated by labor types and endowments. Human capital production function is derived from households' optimization problems. | The effects of reduction in higher education subsidies by 50% with accompanied tax cuts are examined. As subsidies decline, for fixed total unit cost of higher education, private cost increases and investment on education decreases which lead to drop (rise) in skilled (unskilled) labor by 4.01% (1.27%). The effect is higher in rural areas. |
| Gök (2012) | Turkey | Static open economy CGE model with 15 sectors and 10 RHGs (income quintiles in distinction between urban and rural). The income tax reforms are examined. In 1998-99, tax rates were reduced by 5 percentage points for all tax brackets, while in 2005-06, tax rates kept unchanged for the first two tax brackets and are increased by two (five) percentage points for the third and the fourth tax brackets, respectively. | Changes in equivalent variation show that the first reform makes all households worse off unless public consumption decreases due to decreasing revenues. The reform in 2005-06 makes worse off all households except the richest urban and rural resident households. |
| Buffie and Atolia (2012) | Zambia | A dynamic RA-CGE analysis of the effectiveness of the trade policies and foreign aids. The model includes six sectors and four factors of production (skilled and unskilled labor, capital and land). | Protecting the primary agriculture sector causes narrowed wage differential among labor types, improvement in the income distribution, and decline in GDP. |

## Table B.2: Microsimulation-CGE Models

| Study | Country | Model Details | Experiments & Results |
|---|---|---|---|
| Cogneau and Robilliard (2000) | Madagascar | Agricultural production function, household level informal income equation and individual level formal wage equation are estimated, residuals are preserved and assumed to be fix. On the other hand, parameters of linear expenditure system and labor supply function are calibrated by using the survey data. The static model consists of agriculture (domestic and exportable commodities), informal sector (home good) and formal (tradable) sector. There are 4,500 households and 78% of them are agricultural producers. | Reference Case: each household is paid by a cash transfer which is equal to difference between household income and the poverty line. Simulation: targeting households whose income is below half of the poverty line resulted in 19.1% decline in the poverty rate by paying transfer to 66.8% population and the cost of the program constitutes 25% GDP. |
| Cockburn (2002) | Nepal | The static model constitutes 3,373 households in three different regions, two types of labor (skilled and unskilled), two types of capital (agricultural and non-agricultural) and land as factors of production and 16 commodities. To ensure equilibrium of SAM accounts and to make the survey and the national accounts consistent, firstly households are aggregated into eight groups and then the SAM accounts are disaggregated among them. | Effects of revenue-neutral government policy in which all tariffs are replaced by uniform tax on consumption is examined. The results reveal that within-region income inequality reduces and the share of population under the poverty line (half of individual median income) slightly decreases. |
| Bourguignon et al. (2003) | Indonesia | MSM: Real income generation is estimated by using reduced form estimations which include separate equations for each of individual earnings, self-employment income of household and occupational choice of **all** working age members of household. Static RA-CGE module includes 38 sectors, 14 commodities, 14 factors of production (eight types of labor, six types of capital) and 10 RHGs (four agricultural and six non-agricultural). The strategy: Solving RA-CGE module and then feeding MSM by vectors of prices, wages and aggregate employment. | The effects of reduction in the world prices of crude oil and price of exports of processed oil products by 50% and drop in foreign savings by 30% are examined. The 2nd experiment increases Gini coefficient up to 2.1 percentage points while the first experiment lowers it by 0.9 percentage points which depend upon different macroeconomic closure rules. |
| Annabi et al. (2005) | Senegal | Recursive dynamic CGE model incorporates 3,278 households. Since the model has time dimension, in addition to the distributional effects, the growth effects also arise and the authors decompose overall changes in the key variables into these two components. | The effects of unilateral trade liberalization on gross domestic product and welfare are negative in the first period after the shock introduced while at the end of the 20 periods, both of them become positive but the effect is higher for urban households relative to rural households. |
| Cockburn, Fofana, Decaluwe, Mabugu, and Chitiga (2007) | South Africa | Gender-based static fully integrated CGE model. The national accounts and all available household level surveys, including a time use survey, are utilized. The model comprises eight categories of workers by area of residence (urban/rural), age (child/adult) and skill (high, medium and low). | Trade liberalization increases the fraction of households who live below the poverty line by 0.29% and the effect is bigger in rural areas than urban areas. An increase in the poverty rate for female headed households is more than two times of increase in male headed households. |

| | | | |
|---|---|---|---|
| Cororaton and Corong (2009) | Philippine | Recursive dynamic RA-CGE module comprises 41 production sectors, two types of labors, capital and land as factors of production. 10 RHGs are created according to household income. MSM is fed by using average change in the household income, consumer prices and employment (agriculture and non-agriculture). The way of linking MSM and RA-CGE modules is different than the two approaches mentioned above. For instance, although there is no unemployment in the RA-CGE module, they generate a random number for each individual and for each period of time. This number is inversely related with the previous period's labor market outcome of individual, i.e. if individual is employed in the period $t$, the probability of being employed in $t+1$ is lower. | In RA-CGE module, trade liberalization policies (for selected products, for agricultural products and all products) and an increase in productivity of selected agricultural products are considered. In all experiments, real GDP, real exchange rate, and consumer price index follow the exactly same patterns and agricultural output increases. MSM results postulate that country-wide Gini coefficient drops by 13 percentage points if trade liberalization applied for all products and drops by 7 percentage points if productivity in selected agricultural products increase. |

# APPENDIX C

# MATHEMATICAL APPENDIX

## C.1 Calibration of Tobin's q

This section is devoted to explain the calibration process of the initial values of sectoral variables and parameters for dividend maximizer sectors, $DM$. These are Tobin's $q_{DM,0}$s, sectoral capital stocks, $K_{DM,0}$, prices of sectoral capital stocks, $WK_{DM,0}$, and depreciation rates, $\delta_{DM}$. For non-dividend maximizer, $NDM$, firms, sectoral investment are fixed fractions of GDP and their depreciation rates are chosen arbitrarily. As explained in the Section 4.2.9, sectoral investment expenditures (investment by destination) are compiled by using the firm level survey data and the national accounts. Investment by destination is equal to monetary value of new investment equipments and adjustment cost.

$$INV_{DM,0} \;=\; PI_0\, I_{DM,0} \;+\; PVA_{DM,0}\, ADJ_{DM,0} \tag{C.1.1}$$

where adjustment cost is measured by price of value added. The values of sectoral profits are retrieved from the updated input/output table as

$$\begin{aligned} SECPRO_{DM,0} \;=\; WK_{DM,0}\, K_{DM,0} \;=\; PVA_{DM,0}\, VA_{DM,0} - \\ CW_{DM,0}\, (1+ssc_{DM})\, CLD_{DM,0} \end{aligned} \tag{C.1.2}$$

Set $I_{DM,0} = \; \delta_{DM}\; K_{DM,0}$ as a terminal condition

$$\frac{SECPRO_{DM,0}}{INV_{DM,0}} = B_{DM,0} = \frac{WK_{DM,0}}{\delta_{DM} PI_0 + \delta_{DM}^2 \phi_{DM}\; PVA_{DM,0}} \tag{C.1.3}$$

$$WK_{DM,0} = \; B_{DM,0}\; (\delta_{DM}\; PI_0 + \delta_{DM}^2\; \phi_{DM}\; PVA_{DM,0}) \tag{C.1.4}$$

Evaluate (3.21) in the steady state by using (C.1.4) and setting $PI_0 = 1$ yields that

$$\begin{aligned} q_{DM,0}\,(r_0+\delta_{DM}) \;=\; & \delta_{DM}\,(1-corptax)B_{DM,0} + \\ & \delta_{DM}^2\,[(1-corptax)B_{DM,0}+1]PVA_{DM,0}\phi_{DM} \end{aligned} \tag{C.1.5}$$

Using $D_{DM,0} = (1-corptax)B_{DM,0}$ and solving (C.1.5) for $q_{DM,0}$ yields

$$q_{DM,0} = \frac{C+[C^2+(D_{DM,0}-1)^2]^{1/2}}{D_{DM,0}-1} \tag{C.1.6}$$

where $C = 2\ r_0\ PVA_{DM,0}\ \phi_{DM}$. Evaluating (3.22) at the steady state and using the expression for $q_{DM,0}$ gives an expression for sectoral depreciation rate;

$$\delta_{DM} \;= \frac{q_{DM,0}\;-\;1}{2\ PVA_{DM,0}\ \phi_{DM}} \tag{C.1.7}$$

For the given levels of $\delta_s, PI_0, D_{s,0}, B_{s,0}, \phi_s$; we can calibrate $WK_{s,0}$ by using (C.1.4). For the given levels of $SECPRO_{s,0}$ and $WK_{s,0}$; we can calibrate $K_{s,0}$. For the given levels of $q_{s,0}$ and $K_{s,0}$; we can calibrate $DIV_{s,0}$.

## C.2 Linear Expenditure System

This approach assumes that households devote a fraction of their total consumption to subsistence consumption. The amount of it depends upon "income elasticities of consumption" which take different values for each household's demand for each commodity. In that sense, it can not be treated as "minimal consumption to survive" but it is determined by the characteristics of household. In this structure, households weight the utility from discretionary consumption (total consumption minus the bill of subsistence consumption) more.

As stated by Boeters and Savard (2011, 72), minimum consumption expenditures *must* be covered in any case but if informality is a common phenomenon with the absence of well-organized social security system, utilizing linear expenditure system approach becomes particularly important. The demand system implicitly assumes that each household has different perception which is consistent with the characteristics and the overall standard of living of the group (Decaluwé, Patry, et al., 1999, 34). However, it should also be noted that existence of

subsistence consumption restricts saving capacity of households since they have to cover the bill of it (Steger, 2000, 344).

In this appendix, calibration process of variables and parameters related to the first sub-stage of the second stage of household problem are provided. The variables are subsistence level of consumption, $sc_s^{hh}$, household-specific price of composite consumption, $PTC_t^{hh}$, and parameters are income elasticity of consumption by each household and each commodity, $incelas_s^{hh}$, budget shares and marginal budget shares of commodities, $CLES_s^{hh}, MCLES_s^{hh}$. Note that lowercase letters stands for "per capita" variables.

The first order condition of the problem, eq. (3.9), by suppressing time subscripts, for good $s\prime$ in terms of good $s$

$$cd_{s\prime}^{hh} - sc_{s\prime}^{hh} = \frac{PQ_{s,t}}{PQ_{s\prime,t}} \frac{MCLES_{s\prime}^{hh}}{MCLES_s^{hh}} \left(cd_s^{hh} - sc_s^{hh}\right) \tag{C.2.1}$$

The modified version of the constraint of this problem can be written as

$$PTC_0^{hh}\, tc_0^{hh} \;=\; \sum_{s=1}^{S} PQ_{s,0} \left(cd_{s,0}^{hh} - sc_s^{hh}\right) \;+ \sum_{s=1}^{S} PQ_{s,0}\, sc_s^{hh} \tag{C.2.2}$$

Plugging (C.2.1) $\forall\, s\prime$ into (C.2.2) and rearranging yields (3.10) which determines the optimal level of consumption of good $s$ by household $hh$, $cd_s^{hh}$. From this equation, an expression for "income elasticity of consumption" is derived as

$$incelas_s^{hh} \;=\; \frac{\partial\, cd_s^{hh}}{\partial\, \left(PTC^{hh}\, tc^{hh}\right)} \frac{PTC^{hh}\, tc^{hh}}{cd_s^{hh}} \tag{C.2.3}$$

Here, $(PTC^{hh}\; tc^{hh})$ is nothing but total consumption expenditure which is calculated from HBS for each household $hh$. By rearranging,

$$MCLES_s^{hh} \;=\; \frac{PQ_s\, cd_s^{hh}}{PTC^{hh}\, tc^{hh}}\, incelas_s^{hh} \tag{C.2.4}$$

The first term on the RHS of (C.2.4) is nothing but the budget share of commodity $s$ in households' total consumption, $CLES_s^{hh}$. By using income elasticity of consumption obtained from HBS, $(incelas_s^{hh})_{HBS}$, we can calibrate $MCLES_s^{hh}$. Since these shares do not necessarily satisfy $\sum_s MCLES_s^{hh} = 1$, we need to adjust $(incelas_s^{hh})_{HBS}$ proportionally. By following Decaluwé

et al. (2013, 113, eq. C.246),

$$incelas_s^{hh} = \frac{(incelas_s^{hh})_{HBS}\, PTC^{hh}\, tc^{hh}}{\sum_s (incelas_s^{hh})_{HBS}\, PQ_s\, cd_s^{hh}} \tag{C.2.5}$$

The levels of subsistence consumption can be calibrated by two ways. Firstly, price elasticities of consumption can be used but each type of household's demand functions for each commodity have to be estimated. To avoid this cumbersome effort, income elasticity of consumption is used. In this approach, $frisch$ parameter, the negative ratio between total expenditure and discretionary expenditure, that measures the sensitivity of the marginal utility of income to total expenditures (Kinnunen et al., 2012) is used:

$$frisch^{hh} = \frac{-PTC^{hh}\, tc^{hh}}{PTC^{hh}\, tc^{hh} - \sum_s PQ_s\, sc_s^{hh}} \tag{C.2.6}$$

Rearranging this expression yields another representation of $frisch$ parameter:

$$\frac{\sum_s PQ_s\, sc_s^{hh}}{PTC^{hh}\, tc^{hh}} = \frac{1+frisch^{hh}}{frisch^{hh}} \tag{C.2.7}$$

The LHS of expression (C.2.7) is the share of total per capita subsistence consumption expenditures in per capita composite consumption expenditures and from this expression it is evident that $frisch^{hh} < -1$ has to hold. As summarized by Kinnunen et al. (2012, 10), $frisch$ parameter can be estimated but in this study, for each *RIC* (*NRIC*) household, it's value is chosen as -2(-4), which implies that *RIC* (*NRIC*) households devote 50% (75%) of their total consumption expenditures to subsistence consumption. For the given level of $frisch^{hh}$, the level of subsistence consumption can be obtained as follows:

$$sc_s^{hh} = cd_s^{hh} + MCLES_s^{hh}\, \frac{PTC^{hh}\, tc^{hh}}{PQ_s\, frisch^{hh}} \tag{C.2.8}$$

Plugging (3.10) for each $s$ into intratemporal utility function yields that

$$tc^{hh} = (PTC^{hh}\, tc^{hh} - \sum_s PQ_s\, sc_s^{hh})^{\Sigma MCLES_s^{hh}} \prod_{s=1}^{S} \left(\frac{MCLES_s^{hh}}{PQ_s}\right)^{MCLES_s^{hh}} \tag{C.2.9}$$

Imposing $\sum_s MCLES_s^{hh} = 1$ and rearranging ends up with

$$\prod_{s=1}^{S} \left( \frac{PQ_s}{MCLES_s^{hh}} \right)^{MCLES_s^{hh}} = \frac{(PTC^{hh}\ tc^{hh} - \sum_s PQ_s\ sc_s^{hh})}{tc^{hh}} \tag{C.2.10}$$

Finally, replacing nominator of the RHS with $frisch^{hh}$ and solving for $PTC^{hh}$ yields that

$$PTC^{hh} = -frisch^{hh} \prod_{s=1}^{S} \left( \frac{PQ_s}{MCLES_s^{hh}} \right)^{MCLES_s^{hh}} \tag{C.2.11}$$

Even if subsistence consumption is equal to zero (when $frisch^{hh} = -1$), the price of total consumption has to be household-specific when there are multiple representative households.

## C.3 The Resource Constraint of The Economy

This appendix provides the resource constraint of the model economy and confirms that the model equations are consistent. As a first step, multiplying the budget constraints of each RHG by their respective populations and summing over households yields that

$$\begin{aligned} \sum_{hh} PTC_t^{hh}\ tc_t^{hh}\ POP^{hh} + TOTPRSAV_t = \sum_{hh} w_t^{hh}\ LSUP_t^{hh} + DISDIV_t + \\ GTRHH_t + SSTRHH_t - \sum_{hh} SSP_t^{hh} - \sum_{hh} wtax_t^{hh}\ POP^{hh} \end{aligned} \tag{C.3.1}$$

From the second stage of the consumer's problem, it can be easily shown that the first term on the LHS of (C.3.1) is total private consumption expenditures; $\sum_{hh} PTC_t^{hh}\ tc_t^{hh}\ POP^{hh} = \sum_s PQ_{s,t}\ TOTPRCON_{s,t}$. When income items (the RHS of (C.3.1)) are considered, the first term is total wage income receipt of households and it has to be equal to social security contribution net of total labor cost of the firms, i.e. $\sum_{hh} w_t^{hh}\ LSUP_t^{hh} = \sum_s CW_{s,t}\ CLD_{s,t}$. From the enterprises account,

$$DISDIV_t = \sum_{s,t} WK_{s,t}\ K_{s,t} + GTRENT_t - CORPTAXS_t \tag{C.3.2}$$

The social security institution's deficit is equal to

$$SSDEF_t = SSTRHH_t - \sum_{hh} SSP_t^{hh} - \sum_s SSCONT_{s,t} \tag{C.3.3}$$

Plugging these two equations into (C.3.1) yields that

$$\sum_s PQ_{s,t}\, TOTPRCON_{s,t} + TOTPRSAV_t = \sum_s CW_{s,t}\, CLD_{s,t} + \sum_{s,t} WK_{s,t}\, K_{s,t} + GTRENT_t - CORPTAXS_t + GTRHH_t + SSDEF_t + \sum_s SSCONT_{s,t} - \sum_{hh} wtax_t^{hh}\, POP^{hh} \tag{C.3.4}$$

Since sectoral value added is equal to payments to factors of production and direct taxes from these expenditures, such as social security contributions, sum of the first, the second and the seventh items on the RHS is equal to value added

$$\sum_s PQ_{s,t}\, TOTPRCON_{s,t} + TOTPRSAV_t = \sum_s PVA_{s,t}\, VA_{s,t} + GTRENT_t - CORPTAXS_t + GTRHH_t + SSDEF_t - \sum_{hh} wtax_t^{hh}\, POP^{hh} \tag{C.3.5}$$

If taxes from production and domestic and international trade activities are added to sectoral value added, it will end up with nominal gross domestic product. By plugging (3.66), i.e. the definition of gross domestic product from value added approach, into (C.3.5),

$$\sum_s PQ_{s,t}\, TOTPRCON_{s,t} + TOTPRSAV_t = NGDP_t - \sum_s (PRODTAXS_{s,t} + VATREV_{s,t} + TARIFS_{s,t}) + GTRENT_t - CORPTAXS_t + GTRHH_t + SSDEF_t - \sum_{hh} wtax_t^{hh}\, POP^{hh} \tag{C.3.6}$$

From (3.52), we can replace several items in (C.3.6) by considering government revenues as

$$\sum_s PQ_{s,t}\, TOTPRCON_{s,t} + TOTPRSAV_t = NGDP_t + GTRENT_t + GTRHH_t + SSDEF_t - GOVREV_t \tag{C.3.7}$$

By using the intertemporal budget constraint of the government, (C.3.7) becomes

$$\sum_s PQ_{s,t}\, TOTPRCON_{s,t} + TOTPRSAV_t = NGDP_t + GFDS_{t+1} - GFDS_t - GFINT_t - GOVCON_t \tag{C.3.8}$$

Since change in the government foreign debt stock is equal to government savings, from (3.58),

$$\sum_s PQ_{s,t}\, TOTPRCON_{s,t} + TOTPRSAV_t = NGDP_t - GSAV_t - GFINT_t - GOVCON_t \tag{C.3.9}$$

Another definition of the gross domestic product can be written from expenditure approach in which all final domestic demand components and net exports are added to each other as

$$NGDP_t = \sum_s PQ_{s,t}\,(TOTPRCON_{s,t} + QINV_{s,t} + CG_{s,t}) + \sum_s (PWE_s\, QE_{s,t} - PWM_s\, QM_{s,t}) \tag{C.3.10}$$

By plugging (C.3.10) into (C.3.9) by considering $\sum_s PQ_{s,t}\,(QINV_{s,t} + CG_{s,t}) = TOTINV_t + GOVCON_t$ and making necessary adjustments end up with

$$TOTPRSAV_t = TOTINV_t - GSAV_t - GFINT_t + \sum_s (PWE_s\, QE_{s,t} - PWM_s\, QM_{s,t}) \tag{C.3.11}$$

From (3.81), the last three terms on the RHS of (C.3.11) is equal to $FSAV_t$. If we plug this information, it is end up with saving investment equilibrium, i.e. (3.83)

$$TOTPRSAV_t + FSAV_t = TOTINV_t - GSAV_t \tag{C.3.12}$$

# APPENDIX D

# AGGREGATION KEYS

| | COICOP Classification | I/O Table (by NACE Rev.1) |
|---|---|---|
| **AGR** | 1111,1121,1122,1123,1124,1125,1127,1131,1132,1133,1134, 1147,1161,1162,1163,1164,1165,1166,1167,1168,1171,1172, 1173,1174,1175,1177,1178, | 1, 2, 5 |
| **MCP** | 4531,4541,7221 | 10-14, 23 |
| **FBT** | 1112,1113,1114,1115,1126,1141,1142,1143,1144,1145,1146, 1151,1152,1153,1154,1155,1169,1176,1181,1182,1183,1184, 1185,1186,1191,1192,1193,1194,1211,1212,1213,1221,1222, 1223,1224,2111,2121,2122,2131,2211,2212,2213,2311 | 15, 16 |
| **TEX** | 3111,3121,3122,3123,3131,3141,3211,3212,3213,5211,12321 | 17-19 |
| **HNDG** | 4311,5121,5411,5412,5413,5611,5612,6111,6121, 9311,9321,9331,9341,9511,9521,9531,9541,12322 | 20-22, 24-26 |
| **HDG** | 5111,5311,5312,5313,5314,5315,5316,5317,5321,5511,5521, 6131,7111,7112,7121,7131,7141,7211,8211,9111,9112,9121, 9122,9131,9141,9211,9221,9222,12121,12131,12311 | 27-36 |
| **SHE** | 4111,4121,4221,4222,4411,4441,4511,4521,4522,4551,5621, 5622 | 40, 41, 70, 95 |
| **CON** | 4321 | 45 |
| **TRP** | 7241,7311,7321,7331,7341,7351,7361,9611 | 50, 60-63 |
| **PSER** | | 75, 80, 85, 90 |
| **OSER** | remaining | remaining |

# APPENDIX E

# THE BASE-PATH RESULTS

In this section, the base-path (BP) dynamics of sectoral- and household-level variables are summarized. Sectoral results are provided in Table E.1 for *DM* and in Table E.2 for *NDM* sectors, respectively, while household results are available in Table E.3.

***Sectoral Results***

As migration occurs, wage rates of unskilled formal wage earners, $USF$, and informal wage earners, $IW$, decrease while rural resident wage earners', $RH$, wage rate increases. Moreover, since each type of labor is assumed to be imperfect substitute for one another, wage rates of capitalist, $CH$, and skilled formal wage earners, $SF$, also decline. Thus, the cost of labor for the majority of sectors decline and the magnitudes are higher for sectors in which the shares of unskilled formal wage earners and / or informal wage earners in sectoral composite labor demand are high.

For *AGR* and $FBT$, due to higher shares of rural residents in total sectoral labor demand, sectoral composite wages increase and thus composite labor demands decline. Since these sectors are relatively labor-intensive, their value added and output shrink and export supply and supply to the domestic market decline. The optimality condition between these to, eq. (3.41), implies that domestic prices of domestically produced commodities decline. For the given price of exports, total revenue, profit, and sectoral dividends decline. Since investment decision is based on intertemporal dividend maximization, sectoral investment expenditures and sectoral physical investments decrease.

In $TEX$ sector, due to higher informality, composite wage (labor demand) decreases (in-

creases) and sectoral value added and output increase. Increasing domestic supply shrinks domestic price and reduces import demand. For the fixed level of price of exports, total revenues and profits increase. Increasing profits induce investment expenditures and sectoral dividends.

**Table E.1: Sectoral Results of DM Sectors (BP)**

**Percentage deviations from the base-run steady state**

| | T | WK | CW | PVA | I | K | CLD | VA | PD | QD | PX | QE | QM | PQ | QS | INV. | DIV |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 10 | 0.106 | 4.079 | 0.696 | -1.209 | -0.307 | -7.772 | -1.472 | 0.543 | -1.422 | 0.518 | -2.484 | -0.349 | 0.497 | -1.333 | -1.242 | -0.016 |
| | 30 | -0.245 | 6.752 | 0.769 | -0.367 | -0.402 | -13.031 | -2.396 | 0.516 | -2.349 | 0.492 | -3.350 | -1.339 | 0.473 | -2.265 | -0.790 | -0.621 |
| **AGR** | 50 | -0.548 | 8.512 | 0.743 | -0.343 | -0.383 | -16.325 | -2.920 | 0.439 | -2.881 | 0.419 | -3.728 | -2.026 | 0.402 | -2.810 | -1.026 | -0.912 |
| | 75 | -0.788 | 10.259 | 0.762 | -0.380 | -0.376 | -19.338 | -3.416 | 0.409 | -3.379 | 0.390 | -4.164 | -2.587 | 0.375 | -3.313 | -1.271 | -1.141 |
| | 100 | -0.945 | 11.674 | 0.803 | -0.381 | -0.381 | -21.622 | -3.806 | 0.411 | -3.769 | 0.392 | -4.557 | -2.976 | 0.377 | -3.703 | -1.412 | -1.352 |
| | 10 | 0.015 | 0.365 | 0.119 | -1.251 | -1.037 | -1.554 | -1.192 | 0.222 | -1.154 | 0.203 | -1.592 | -0.715 | 0.202 | -1.114 | -1.293 | -0.691 |
| | 30 | -0.240 | 1.217 | 0.192 | -1.494 | -1.415 | -3.537 | -2.053 | 0.107 | -2.035 | 0.098 | -2.245 | -1.825 | 0.097 | -2.016 | -1.826 | -1.440 |
| **FBT** | 50 | -0.446 | 1.703 | 0.190 | -1.686 | -1.623 | -4.724 | -2.558 | -0.010 | -2.559 | -0.009 | -2.540 | -2.578 | -0.009 | -2.561 | -2.220 | -1.869 |
| | 75 | -0.609 | 2.115 | 0.194 | -1.899 | -1.844 | -5.746 | -3.022 | -0.089 | -3.037 | -0.082 | -2.863 | -3.210 | -0.081 | -3.053 | -2.592 | -2.258 |
| | 100 | -0.731 | 2.431 | 0.199 | -2.018 | -2.018 | -6.521 | -3.380 | -0.134 | -3.402 | -0.123 | -3.142 | -3.660 | -0.122 | -3.426 | -2.808 | -2.627 |
| | 10 | 0.037 | -0.641 | -0.236 | -0.637 | -0.757 | 0.260 | -0.350 | -0.201 | -0.429 | -0.161 | -0.029 | -0.828 | -0.177 | -0.476 | -0.678 | -0.755 |
| | 30 | -0.348 | -0.979 | -0.602 | -0.072 | -0.319 | 0.636 | 0.063 | -0.696 | -0.215 | -0.558 | 1.188 | -1.600 | -0.615 | -0.378 | -0.523 | -0.781 |
| **TEX** | 50 | -0.675 | -1.246 | -0.904 | 0.205 | 0.052 | 0.921 | 0.400 | -1.062 | -0.029 | -0.850 | 2.129 | -2.140 | -0.938 | -0.278 | -0.535 | -0.693 |
| | 75 | -0.937 | -1.497 | -1.162 | 0.401 | 0.318 | 1.174 | 0.661 | -1.366 | 0.105 | -1.093 | 2.898 | -2.612 | -1.208 | -0.216 | -0.575 | -0.660 |
| | 100 | -1.098 | -1.694 | -1.338 | 0.455 | 0.455 | 1.369 | 0.821 | -1.574 | 0.178 | -1.259 | 3.408 | -2.952 | -1.392 | -0.192 | -0.686 | -0.713 |
| | 10 | 0.073 | -0.643 | 0.016 | -1.224 | -0.830 | 0.245 | -0.745 | 0.001 | -0.745 | 0.001 | | | 0.001 | -0.745 | -1.272 | -0.606 |
| | 30 | -0.296 | -0.105 | -0.281 | -0.748 | -0.846 | -1.129 | -0.868 | -0.312 | -0.868 | -0.312 | | | -0.312 | -0.868 | -1.196 | -1.122 |
| **SHE** | 50 | -0.621 | 0.308 | -0.548 | -0.785 | -0.806 | -2.180 | -0.915 | -0.568 | -0.915 | -0.568 | | | -0.568 | -0.915 | -1.504 | -1.398 |
| | 75 | -0.877 | 0.615 | -0.760 | -0.858 | -0.817 | -3.014 | -0.992 | -0.773 | -0.992 | -0.773 | | | -0.773 | -0.992 | -1.793 | -1.655 |
| | 100 | -1.050 | 0.819 | -0.904 | -0.852 | -0.852 | -3.596 | -1.071 | -0.912 | -1.071 | -0.912 | | | -0.912 | -1.071 | -1.930 | -1.920 |
| | 10 | 0.030 | -0.702 | -0.111 | -0.980 | -1.005 | 0.093 | -0.795 | -0.128 | -0.820 | -0.115 | -0.566 | -1.073 | -0.110 | -0.856 | -1.024 | -0.897 |
| | 30 | -0.416 | -1.332 | -0.593 | -0.688 | -0.750 | 0.636 | -0.485 | -0.623 | -0.610 | -0.561 | 0.641 | -1.845 | -0.536 | -0.785 | -1.170 | -1.151 |
| **TRP** | 50 | -0.744 | -1.731 | -0.935 | -0.535 | -0.566 | 0.936 | -0.278 | -0.969 | -0.475 | -0.871 | 1.481 | -2.394 | -0.833 | -0.747 | -1.314 | -1.292 |
| | 75 | -1.003 | -2.076 | -1.211 | -0.457 | -0.468 | 1.172 | -0.154 | -1.248 | -0.409 | -1.122 | 2.125 | -2.880 | -1.074 | -0.760 | -1.473 | -1.455 |
| | 100 | -1.173 | -2.326 | -1.396 | -0.436 | -0.436 | 1.332 | -0.098 | -1.438 | -0.393 | -1.292 | 2.535 | -3.237 | -1.237 | -0.797 | -1.612 | -1.658 |
| | 10 | 0.015 | -1.943 | -0.449 | -1.594 | -1.502 | 2.470 | -0.582 | -0.356 | -0.689 | -0.303 | 0.022 | -1.395 | -0.325 | -0.750 | -1.674 | -1.389 |
| | 30 | -0.377 | -2.519 | -0.885 | -1.067 | -1.312 | 3.072 | -0.297 | -0.846 | -0.553 | -0.718 | 1.151 | -2.228 | -0.773 | -0.699 | -1.547 | -1.758 |
| **OSER** | 50 | -0.703 | -2.751 | -1.189 | -0.932 | -1.076 | 3.134 | -0.101 | -1.184 | -0.462 | -1.005 | 1.939 | -2.806 | -1.083 | -0.666 | -1.694 | -1.813 |
| | 75 | -0.970 | -2.995 | -1.450 | -0.893 | -0.941 | 3.239 | 0.028 | -1.470 | -0.423 | -1.247 | 2.569 | -3.328 | -1.344 | -0.676 | -1.883 | -1.911 |
| | 100 | -1.143 | -3.221 | -1.636 | -0.904 | -0.904 | 3.397 | 0.092 | -1.669 | -0.422 | -1.416 | 2.988 | -3.719 | -1.527 | -0.709 | -2.048 | -2.093 |

**Note:** The definitions of the column variables are as follows: *T* time periods, *WK* price of sectoral capital, *CW* price of sectoral composite labor, *PVA* price of sectoral value added, *I* real physical additions to the existing capital stock, *K* physical sectoral capital stock, *CLD* sectoral composite labor demand, *VA* sectoral real value added, *PD* domestic price of domestically produced commodity, *QD* domestic supply of domestically produced commodity, *PX* price of output, *QE* export supply, *QM* import demand, *PQ* composite prices of domestic commodity, *QS* composite supply of domestic commodity, *INV* the value of nominal investment expenditures and *DIV* sectoral dividends.

In shelter & related activities sector, $SHE$, increasing composite wage leads to decline in sectoral value added and output which is equal to supply to the domestic market. Declining output leads to decreases in profit, sectoral dividend, and sectoral investment expenditures. Since this sector's output is non-tradable, it could not benefit from inelastic demand in abroad.

In $TRP$ and $OSER$ sectors, due to declines in sectoral composite wages, composite labor demands and sectoral value added increase. Increasing outputs lead to increases in both export supply and supply to the domestic market but the optimality condition between these to, eq. (3.41), implies that domestic prices decline. As a result, total revenues and profits decline and thus, sectoral dividends and sectoral investment expenditures decrease. However, price effects are suppressed and physical additions to the capital stock increase. Domestic prices decline and supplies to the domestic market increase. The substitution between imported and

domestically produced commodities, eq. (3.38), implies that import demands shrink.

Non-dividend maximizer sectors' investment expenditures are equal to pre-determined fractions of GDP. Since it declines by 1.6%, at the end of the horizon, sectoral investment expenditures are all decline. Price of investment, which is product of composite price of domestic commodities, i.e. $PQ$, declines. However, in each sector, physical addition to the sectoral capital stock that is equal to investment expenditure over the price of investment, i.e. $INV/PI$, decreases.

In this subset of firms, the behavior of construction, *CON* differs since its output has no imported substitute. Since rural household's private consumption demand constitutes 55% of total private consumption demand of this commodity (on SAM), as rural population declines, its final demand also declines. By considering its openness to the international trade, sector does not need to increase its output. Therefore, declining wage rates are followed by decline in the sectoral composite wage rate but composite labor demand also decline. Although total output declines, export supply at world market prices increase but sectoral profits decline. For pre-determined level of investment expenditures, sectoral dividends also shrink.

**Table E.2: Sectoral Results of NDM Sectors (BP)**

**Percentage deviations from the base-run steady state**

| | T | WK | CW | PVA | I | K | CLD | VA | PD | QD | PX | QE | QM | PQ | QS | INV. | DIV |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 10 | 0.668 | 0.041 | 0.421 | -0.858 | -1.638 | -0.712 | -1.275 | 0.183 | -1.167 | 0.128 | -1.527 | -0.805 | 0.046 | -0.896 | -0.886 | -1.274 |
| | 30 | 0.145 | -1.768 | -0.614 | -0.651 | -0.829 | 2.081 | 0.308 | -0.581 | -0.043 | -0.406 | 1.128 | -1.200 | -0.147 | -0.910 | -1.115 | 0.635 |
| **MCP** | 50 | 0.038 | -3.113 | -1.218 | -0.549 | -0.609 | 4.279 | 1.293 | -1.044 | 0.651 | -0.729 | 2.787 | -1.440 | -0.265 | -0.917 | -1.282 | 1.611 |
| | 75 | -0.005 | -4.181 | -1.678 | -0.509 | -0.524 | 6.050 | 2.027 | -1.405 | 1.152 | -0.980 | 4.057 | -1.671 | -0.357 | -0.965 | -1.456 | 2.319 |
| | 100 | -0.022 | -4.889 | -1.978 | -0.508 | -0.508 | 7.226 | 2.486 | -1.645 | 1.455 | -1.146 | 4.877 | -1.855 | -0.419 | -1.028 | -1.601 | 2.763 |
| | 10 | 0.836 | -0.944 | 0.106 | -0.858 | -1.638 | 0.486 | -0.777 | -0.012 | -0.782 | -0.010 | -0.758 | -0.805 | -0.007 | -0.791 | -0.886 | -0.118 |
| | 30 | 0.230 | -2.153 | -0.749 | -0.651 | -0.829 | 2.077 | 0.347 | -0.665 | 0.084 | -0.535 | 1.428 | -1.243 | -0.410 | -0.428 | -1.115 | 4.561 |
| **HNDG** | 50 | 0.146 | -3.052 | -1.173 | -0.549 | -0.609 | 3.338 | 0.984 | -1.032 | 0.571 | -0.829 | 2.679 | -1.493 | -0.637 | -0.226 | -1.282 | 7.735 |
| | 75 | 0.132 | -3.821 | -1.502 | -0.509 | -0.524 | 4.402 | 1.460 | -1.323 | 0.926 | -1.062 | 3.651 | -1.728 | -0.818 | -0.100 | -1.456 | 10.280 |
| | 100 | 0.140 | -4.363 | -1.725 | -0.508 | -0.508 | 5.139 | 1.762 | -1.522 | 1.144 | -1.222 | 4.295 | -1.911 | -0.942 | -0.038 | -1.601 | 11.995 |
| | 10 | 0.730 | -0.845 | 0.050 | -0.858 | -1.638 | 0.240 | -0.836 | -0.066 | -0.879 | -0.044 | -0.748 | -1.010 | -0.036 | -0.938 | -0.886 | -1.389 |
| | 30 | 0.866 | -3.101 | -0.860 | -0.651 | -0.829 | 4.064 | 1.247 | -0.932 | 0.612 | -0.620 | 2.514 | -1.256 | -0.516 | -0.229 | -1.115 | 15.608 |
| **HDG** | 50 | 1.168 | -4.521 | -1.322 | -0.549 | -0.609 | 6.538 | 2.408 | -1.423 | 1.421 | -0.944 | 4.370 | -1.444 | -0.789 | 0.130 | -1.282 | 25.480 |
| | 75 | 1.464 | -5.700 | -1.688 | -0.509 | -0.524 | 8.613 | 3.316 | -1.818 | 2.038 | -1.206 | 5.853 | -1.639 | -1.010 | 0.378 | -1.456 | 33.423 |
| | 100 | 1.690 | -6.526 | -1.939 | -0.508 | -0.508 | 10.076 | 3.926 | -2.092 | 2.443 | -1.385 | 6.867 | -1.798 | -1.163 | 0.527 | -1.601 | 38.900 |
| | 10 | 0.610 | -0.263 | 0.345 | -0.858 | -1.638 | -0.344 | -1.247 | 0.115 | -1.244 | 0.114 | -1.472 | | 0.115 | -1.244 | -0.886 | -2.668 |
| | 30 | -0.232 | -0.211 | -0.226 | -0.651 | -0.829 | -0.860 | -0.838 | -0.380 | -0.847 | -0.376 | -0.088 | | -0.380 | -0.847 | -1.115 | -0.455 |
| **CON** | 50 | -0.579 | -0.259 | -0.482 | -0.549 | -0.609 | -1.087 | -0.754 | -0.640 | -0.769 | -0.633 | 0.514 | | -0.640 | -0.769 | -1.282 | -0.137 |
| | 75 | -0.813 | -0.330 | -0.667 | -0.509 | -0.524 | -1.246 | -0.743 | -0.841 | -0.763 | -0.831 | 0.928 | | -0.841 | -0.763 | -1.456 | -0.007 |
| | 100 | -0.953 | -0.405 | -0.787 | -0.508 | -0.508 | -1.328 | -0.757 | -0.976 | -0.780 | -0.964 | 1.185 | | -0.976 | -0.780 | -1.601 | 0.105 |
| | 10 | -1.422 | -2.320 | -2.279 | | | 1.383 | 1.320 | -2.279 | 1.320 | | | | -2.279 | 1.320 | | |
| | 30 | -2.349 | -4.267 | -4.182 | | | 3.021 | 2.883 | -4.182 | 2.883 | | | | -4.182 | 2.883 | | |
| **PSER** | 50 | -2.948 | -5.490 | -5.377 | | | 4.061 | 3.874 | -5.377 | 3.874 | | | | -5.377 | 3.874 | | |
| | 75 | -3.491 | -6.561 | -6.425 | | | 4.969 | 4.740 | -6.425 | 4.740 | | | | -6.425 | 4.740 | | |
| | 100 | -3.898 | -7.343 | -7.191 | | | 5.629 | 5.369 | -7.191 | 5.369 | | | | -7.191 | 5.369 | | |

**Note:** For definitions of the column variables, please see the Note of Table E.1.

The rest of non-dividend maximizer sectors benefit from declining wages. As sectoral composite wages decline, composite labor demands and thus sectoral value added increase. In-

creasing outputs allow firms to increase their supplies to the domestic market and to the international markets. As supplies to the domestic market increase, domestic prices decline which make these commodities relatively cheaper than their imported substitutes and cause reduction in import demands. Increasing outputs induce sectoral profits and since it is accompanied by decreasing sectoral investment expenditures, sectoral dividends increase.

***Households***

Common changes in the components of household disposable income are as follows. Along the BP, as GDP decline, transfers from the government and from the SSI decline as well. Decreasing distributed dividends also have negative repercussions on dividend income of the Ricardian households. On the expenditure side, since prices of all domestic composite commodities (except agriculture) decline, household-specific price of composite consumption, $PTC_t^{hh}$, also declines for all households.

Capitalist and skilled formal wage earner households, $CH$ and $SF$, respectively, decrease their per capita composite labor supplies due to declining wage rates. Thus their wage incomes decline. In addition to decline in the other components, their disposable income shrink by 1.47% and 3.13%, respectively. Due to declining prices, per capita composite consumption increase. By accompanied decreases in disposable incomes, per capita savings decline by 6.9% and 23.8%, respectively.

For rural resident wage earners, $RH$, as expected, their wage rate increases (2.97%) due to decreasing population. Their total labor supply declines by 12.7%. As wage rate increases, wage income increases. On the contrary, the effects of declining other components of disposable income are compensated partially as population decline. Along the BP, cumulative decline in the population is 12.06%. Thus, per capita disposable income increases by 11.71%, at the end of the horizon. Due to decreasing prices, they also increase their per capita composite consumption (0.92%) but their per capita savings explode by 64.73%. The reason of increasing per capita labor supply despite an increase in the wage rate relies on the intratemporal substitution between consumption and leisure, eq. (3.4), which solves for the equilibrium level of per capita composite labor supply. For rural households, change in per worker wage is positive, thus RHS of eq. (3.4) is negative. Since $PTC_t^{RH}$ declines, per capita consumption increases. Therefore, eq. (3.4) implies that leisure has to decline, thus labor supply has to

## Table E.3: Households Results (BP)

**Percentage deviations from the base-run steady state**

| | | T | ls | LSUP | w | winc | inc | PTC | tc | sav | POP |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 10 | -0.986 | -1.511 | -0.384 | -1.366 | -0.905 | -0.055 | 0.056 | -4.234 | |
| | | 30 | -1.338 | -1.923 | -0.520 | -1.851 | -1.085 | -0.401 | 0.402 | -5.081 | |
| | **CH** | 50 | -1.573 | -2.212 | -0.611 | -2.174 | -1.211 | -0.645 | 0.649 | -5.668 | |
| | | 75 | -1.805 | -2.516 | -0.700 | -2.492 | -1.351 | -0.843 | 0.850 | -6.323 | |
| | | 100 | -1.991 | -2.761 | -0.772 | -2.747 | -1.473 | -0.976 | 0.986 | -6.897 | |
| | | 10 | 1.289 | -3.148 | 0.785 | 2.084 | 2.050 | -0.024 | 0.024 | 11.334 | -2.887 |
| | | 30 | 2.638 | -6.633 | 1.620 | 4.301 | 5.684 | -0.356 | 0.357 | 31.426 | -6.506 |
| **Ricardian** | **RH** | 50 | 3.456 | -8.889 | 2.134 | 5.663 | 8.038 | -0.594 | 0.597 | 44.440 | -8.729 |
| | | 75 | 4.201 | -10.848 | 2.606 | 6.916 | 10.135 | -0.784 | 0.790 | 56.032 | -10.650 |
| | | 100 | 4.771 | -12.270 | 2.970 | 7.883 | 11.708 | -0.911 | 0.919 | 64.728 | -12.056 |
| | | 10 | -1.450 | -2.154 | -1.188 | -2.621 | -1.410 | -0.062 | 0.062 | -10.115 | |
| | | 30 | -2.539 | -3.530 | -2.062 | -4.549 | -2.110 | -0.410 | 0.412 | -15.138 | |
| | **SF** | 50 | -3.241 | -4.354 | -2.617 | -5.773 | -2.563 | -0.658 | 0.663 | -18.386 | |
| | | 75 | -3.874 | -5.086 | -3.112 | -6.866 | -2.986 | -0.859 | 0.866 | -21.424 | |
| | | 100 | -4.348 | -5.632 | -3.479 | -7.676 | -3.313 | -0.995 | 1.005 | -23.771 | |
| | | 10 | 0.191 | 0.896 | -1.334 | -1.146 | -1.423 | -0.031 | -1.393 | | 0.999 |
| | | 30 | 0.310 | 1.728 | -2.438 | -2.136 | -2.582 | -0.361 | -2.229 | | 2.251 |
| | **USF** | 50 | 0.378 | 2.229 | -3.143 | -2.777 | -3.316 | -0.605 | -2.728 | | 3.021 |
| | | 75 | 0.439 | 2.686 | -3.765 | -3.343 | -3.966 | -0.801 | -3.191 | | 3.686 |
| | | 100 | 0.486 | 3.042 | -4.226 | -3.760 | -4.447 | -0.932 | -3.548 | | 4.172 |
| | | 10 | 0.362 | 3.071 | -2.407 | -2.054 | -2.577 | -0.029 | -2.549 | | 4.715 |
| | | 30 | 0.757 | 8.329 | -4.593 | -3.870 | -4.939 | -0.356 | -4.600 | | 10.626 |
| | **IW** | 50 | 0.986 | 11.600 | -5.872 | -4.944 | -6.316 | -0.594 | -5.757 | | 14.258 |
| | | 75 | 1.174 | 14.366 | -6.954 | -5.861 | -7.478 | -0.784 | -6.747 | | 17.395 |
| **non-** | | 100 | 1.308 | 16.352 | -7.735 | -6.528 | -8.314 | -0.912 | -7.470 | | 19.691 |
| **Ricardian** | | | | | | | -0.886 | -0.009 | -0.876 | | |
| | | | | | | | -1.115 | -0.325 | -0.792 | | |
| | **TRF** | | | | | | -1.282 | -0.559 | -0.727 | | |
| | | | | | | | -1.456 | -0.746 | -0.716 | | |
| | | | | | | | -1.601 | -0.870 | -0.738 | | |
| | | | | | | | -0.886 | -0.038 | -0.848 | | |
| | | | | | | | -1.115 | -0.380 | -0.738 | | |
| | **RET** | | | | | | -1.282 | -0.627 | -0.659 | | |
| | | | | | | | -1.456 | -0.825 | -0.636 | | |
| | | | | | | | -1.601 | -0.958 | -0.650 | | |

**Note:** The definitions of the households are as follows: *CH* capitalist, *RH* rural resident, *SF* skilled formal wage earners (these three constitute the set of Ricardian households), *USF* unskilled formal wage earners, *IW* informal wage earners, *TRF* transfer receiver households and *RET* retirees (the last four constitute the set of non-Ricardian households). The figures are percentage deviations of per capita variables (except *LSUP*, *PTC* and *POP*) from their respective values in the base-run steady state.

increase.

For non-Ricardian households who supply her labor, increasing per capita composite labor supplies are evident from declining disposable incomes. Since populations of these two RHGs increase, their per capita transfer incomes from the government and from the SSI decrease. Therefore, their disposable incomes and per capita composite consumptions decline. They have to increase their per capita composite labor supplies to compensate their losses. For other two non-Ricardian households, since transfer incomes decrease due to decreasing GDP, their disposable incomes also decrease. Although prices decline, per capita composite consumptions also shrink.

# APPENDIX F

# TURNITIN ORIGINALITY REPORT

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Internal Migration, Redistributive Policies and Income Distribution in Turkey: An Intertemporal CGE Analyses by Aykut Mert Yakut

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PIERRE-RICHARD AGENOR, "THE MACROECONOMICS OF POVERTY REDUCTION", The Manchester School, 7/2005

# APPENDIX G

# CURRICULUM VITAE

## PERSONAL INFORMATION


| | |
|---|---|
| **Surname, Name:** | Yakut, Aykut Mert |
| **Nationality:** | Turkish |
| **Date and Place of Birth:** | 10 August 1984, İzmir-Turkey |
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| **E-mail:** | mertyakut@gmail.com |
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## EDUCATION

| Degree | Institution | Year of Graduation |
|---|---|---|
| BSc | Ege University, Department of Economics, İzmir-Turkey | 2007 |
| High School | Selma Yiğitalp Lisesi, İzmir-Turkey | 2002 |

## FIELDS of ACADEMIC INTEREST

Macroeconomics, Microeconometrics, Computable General Equilibrium Modeling, Quantitative Analysis, Social Policies, Income Distribution

## WORK EXPERIENCE

| Year | Place | Enrollment |
|---|---|---|
| 2008 - Present | METU, Department of Economics, Ankara-Turkey | Research Assistant |

## PUBLICATIONS

Yakut, A. M. (2015), "Labor Supply and Welfare Benefits in Turkey", *İktisat, İşletme ve Finans*, 30(347), 9-36

## PRESENTATIONS

### *Conferences*

*Internal Migration, Redistributive Policies and Income Distribution in Turkey: An Intertemporal CGE Analysis*, 19th Annual Conference on Global Economic Analysis, June 15-17, 2016, Washington DC-USA

*Effects of Redistributive Policies on Income Distribution: An Intertemporal CGE Analysis*, EY International Congress on Economics II, November 5-6, 2015, Ankara-Turkey

*CGE Analysis of Redistributive Policies and Income Distribution in Turkey*, EconAnadolu 2015: Anadolu International Conference in Economics, June 10-12, 2015, Eskişehir-Turkey

*Labor Market Outcomes of Welfare Benefits in Turkey*, EconAnadolu 2015: Anadolu International Conference in Economics, June 10-12, 2015, Eskişehir-Turkey (with E. Memiş, Ankara Univ.)

*Labor Market Outcomes of Welfare Benefits in Turkey*, Turkish Economy and Development Economics Workshop in Honor of Fikret Şenses, April 2-4, 2015, METU-NCC, Cyprus (with E. Memiş, Ankara Univ.), (in Turkish)

*Analysis of Income Distribution in Turkey: CGE Approach*, 35th Annual Meeting of the Middle East Economic Association (MEEA), January 3-6, 2015, Boston, MA, USA

*Income Distribution in Turkey: A CGE Approach*, 4th International Conference on Economics, Turkish Economic Association (ICE-TEA), October 18-20, 2014, Antalya-Turkey

*Hours of Work Decision and Welfare Benefits in Turkey*, EconAnadolu 2013: Anadolu International Conference in Economics, June 19-21, 2013, Eskişehir-Turkey

*The Empirical Analysis of Thirlwall Law: The Case of Turkey*, 7th Ekonomik Yaklaşım Kongresi: "Türkiye Ekonomisinin Dinamikleri: Politika Arayışları", December 22-23, 2011, Ankara-Turkey (with P. Akçagün, METU)

*Total Factor Productivity in Turkish Manufacturing Industry and Analysis of International Competition: 1972 - 2001*, 10th International Students' Conference on Economics, May 3 – 4, 2007, İzmir-Turkey, (in Turkish)

### *Others*

*Internal Migration, Redistributive Policies and Income Distribution in Turkey: An Intertemporal CGE Analysis*, Economics and Technology University, Center for Social Policy Research Seminar, April 2016, Ankara-Turkey, (in Turkish)

*Hours of Work Decision and Welfare Benefits in Turkey*, Ankara University Faculty of Political Sciences, Department of Economics Seminar, December 2013, Ankara-Turkey, (in Turkish)

*Income Distribution in Turkey: A CGE Approach*, Ege University, Department of Economics Seminar, November 2014, İzmir-Turkey, (in Turkish)

## TEACHING EXPERIENCE

Introduction to Economics (ECON101-ECON102 - undergraduate)
Intermediate Macroeconomics (ECON202 - undergraduate)
Introduction to International Economics I (ECON353 - undergraduate)
Introduction to International Economics II (ECON354 - undergraduate)
Computable General Equilibrium Models (ECON608 - graduate)

## PROFESSIONAL ACTIVITIES

***Projects***

*Increasing the Institutional Capacity of the Ministry of Family and Social Policy in the Field of Social Inclusion Policy*, Ministry of Family and Social Policy, Supervisor: E. Memis (Ankara Univ.), Junior Non Key Expert

*Preparation of Background Paper on Women and Poverty*, for UNDP Conference for Beijing +20, UNWomen, Research Assistant (Supervisor: E. Memiş, Ankara Univ.)

*Impact Analysis of Employment Subsidy Programmes*, Ministry of Labor and Social Security, Research Assistant (Supervisor: H. Ercan, METU)

*The Effects of Composition of Public Expenditures on Income Distribution in Turkey: Computable General Equilibrium Approach*, Scientific Research Project (BAP), Middle East Technical University, Research Assistant (Supervisor: E. Voyvoda, METU)

*Fiscal Sustainability in Europe: FISCSUST*, Marie Curie Career Integration Grants within the 7th EU Framework Programme, Research Assistant (Supervisor: K. Parmaksız, METU)

*Research and Policy Development on Time Use and Poverty*, The Levy Economics Institute & The United Nations Development Programme–Turkey, Research Assistant (Supervisor: E. Memiş, Ankara Univ.)

***Editorial Duties***

September 2008 - : Editorial Assistant, *METU Studies in Development*

***Referees***

*İktisat, İşletme ve Finans; Ekonomik Yaklaşım; Panoeconomicus; Ege Akademik Bakış*

***Others***

2007, Member of Organization Committee, 10th International Students' Conference on Economics, İzmir, Turkey

2006, Member of Organization Committee, 9th International Students' Conference on Economics, İzmir, Turkey

2005, Member of Organization Committee, 8th International Students' Conference on Economics, İzmir, Turkey

## AWARDS

*Australia Awards – MIKTA Short Course*, Australian Department of Foreign Affairs and Trade, July 6-17, 2015, Australian National University, Canberra, Australia

*The Best Paper*, The Central Bank of Republic of Turkey, with presentation of "Total Factor Productivity in Turkish Manufacturing Industry and Analysis of International Competition: 1972 – 2001", 10th International Students' Conference on Economics, May 3 – 4, 2007, İzmir, Turkey (available on www.tcmb.gov.tr)

## LINGUISTIC

Turkish: Native
English: Fluent

## COMPUTATIONAL SKILLS

GAMS, STATA, MATLAB, LaTeX, Microsoft Office

## HOBBIES

trekking, squash

## REFERENCES

Available upon request

# APPENDIX H

# TURKISH SUMMARY

***Giriş***

Sosyal güvenlik, sağlık hizmetleri, sosyal hizmetler ve sosyal yardım programları sosyal politika şemsiyesi altında toplanmaktadır. Gelir dağılımında kötüleşme ve yoksulluk gibi sorunların üstesinden gelmek için kullanılan temel politika araçlarıdır. Bu politikalar, gerek etkinliklerinin değerlendirilmesi gerekse ekonomik ve beşeri yapıda gerçekleşen değişimlere uyumlarının sağlanmasına yönelik reform önerilerinin sunulması için önemli sayıda akademik çalışmanın konusu olmaktadırlar.

Son yıllarda, istihdam yaratma kapasitesi sanayi ve inşaat gibi geleneksel sektörlere göre yüksek olan ancak düşük verimlilik nedeniyle ücretlerin ve ücret artışlarının sınırlı olduğu hizmetler sektörünün milli gelir içerisinde payı artmaktadır, Esping-Andersen (1999). Yazarın, "sanayileşme sonrası" olarak adlandırdığı bu sürece ek olarak, teknolojik ilerlemeler-in de etkisiyle, bir yandan istihdam yaratımı zayıf kalmakta, diğer yandan düşük ücretler nedeniyle çalışan kesimler dahi yoksulluk riski ile karşı karşıya kalmaktadırlar. Bu sorunun çözümü için sanayi ve inşaata dayalı ekonomik üretim döneminde oluşturulmuş refah devleti uygulamalarının dönüşüme uğramaları kaçınılmaz hale gelmiştir. Bulunan çözüm, emek piyasası düzenlemeleri ile bireylerin ve hanelerin refahlarındaki düşüşe engel olmak için uygulanan sosyal politikaların eşgüdüm halinde tasarlanmaları ve uygulanmalarıdır.

Bu kapsamda, güvenceli esneklik (*flexicurity*) olarak adlandırılan uygulamalar ortaya atılmıştır. Önerilen politikalar her ne kadar 1970'li yıllardan bu yana Danimarka başta olmak üzere çeşitli İskandinav ülkelerinde yaygın olarak kullanılsa da, Avrupa Birliği'nin (AB) gündemine gelişi ve emek piyasasını şekillendiren bir model oluşu son 10 yılda gerçekleşmiştir. Bu

politika işverenlere, gerekli hallerde kişileri kolayca işten çıkarabilmelerine olanak veren kısa süreli iş akdi yoluyla istihdam yaratmalarına izin verirken (esneklik - *flexibility*), bireylere de işsiz kalmaları durumunda işsizlik sigortası veya sosyal yardımlarla refahlarında düşme yaşamayacakları ve sahip oldukları vasıflara uygun bir iş bulacakları konusunda güvence (*security*) sunmaktadır. Politikanın tasarımında karşılaşılan temel zorluk, bireylerin sosyal yardımlardan yararlanmak için işgücü piyasasından çıkmalarına engel olunamamasıdır. Bu nedenle güvenceli esneklik, aktif işgücü piyasası politikaları ile desteklenmektedir. Bu politikalar, kişilerin sosyal yardım almaya hak kazanmak için belirli faaliyetlere (iş arama, mesleki eğitim kursuna katılma, iş başında öğrenme vb. gibi) katılmalarının zorunlu tutulmasıdır. Buna ek olarak, hem işsizlik sigortası ödemelerini almaya hak kazanmak için gerekli koşullar zorlaştırılmış hem de ödeme alınabilecek süre kısaltılmıştır.

2008-9 yıllarında dünya ekonomisini ciddi şekilde etkileyen küresel finansal krize ek olarak Akdeniz'e kıyısı olan AB üyesi devletlerde karşımıza çıkan borç krizi, birliğin sosyal politika alanında son yıllarda kaydettiği ilerlemeleri sekteye uğratmıştır. AB'nin reform çabaları, Almanya Başbakanı Angela Merkel'in "dünya nüfusunun %7'sine sahip olup, küresel gelirinin %25'ini üretirken, sosyal koruma harcamalarının %50'sini finanse etmeyi sürdüremeyiz" demeci etrafında şekillenmektedir (Begg vd., 2015; 4). Bu kapsamda, mali dengeleri sağlamaya yönelik olarak sosyal harcamalarda kesintiye gitmek ve emek piyasası uygulamalarını sosyal politikalar ile uyumlu hale getirmek üye devletler arasında ortak noktaları oluşturmaktadır.

Sosyal yardım programlarının aktif işgücü piyasası politikaları ile uyumlandırılmadan, karşılıksız ve zaman kısıdı olmaksızın uygulanması, bireylerin işgücü piyasalarına katılmalarına engel olmakta veya daha kısa sürelerle çalışmalarına (yani çalışma saatlerini azaltmalarına) neden olmaktadır. Aktif işgücü piyasası uygulamaları, temelde bu sorunun çözümüne yönelik olarak tasarlanmış ve çeşitli ülkelerde başarılı sonuçlar ortaya çıkarmıştır Kaushal ve Kaestner (2001) – ABD, Fok ve McVicar (2012) – Avustralya. Bu politikalar aracılığıyla bir yandan bireylerin kendi kendilerine yetme kapasitelerinin attırılması (Lorentzen ve Dahl, 2005) sağlanırken diğer yandan da sosyal programlara katılmak için sosyal güvenceden yoksun bir şekilde çalışmalarına engel olunmalıdır (Woods vd., 2002).

1950'li yıllarda sosyal güvenlik kurumlarının kurulması ile başlayan Türkiye'nin refah rejimi uygulamaları, 1980'lerde sosyal yardım programlarının kurumsallaşması ile devam etmiştir.

Sosyal politikaları yeniden şekillendirme çalışmaları, 1990'ların sonlarında sosyal güvenlik sistemi reformu ile başlamış, bunu 2000'li yılların başında sağlıkta dönüşüm programları izlemiş, sosyal yardım programlarının da çeşitliliğinde, sayısında ve toplam bütçesinde önemli iyileştirmeler yapılmıştır. Buna karşılık, seçimlerden önce artan yardım miktarları ve tarihsel olarak eleştirilen kayırmacı kimliği nedeniyle sosyal yardım programları ekonomik olduğu kadar siyasi tartışmaların da merkezinde olmaktadır. Türkiye için bu programlara kayıtlı olarak yardım almanın, bireylerin emek piyasasına katılma ve / veya daha az sürelerle çalışmaları üzerindeki olası etkileri çok az sayıda çalışmaya konu olmuştur. Şeker (2011) herhangi bir kanaldan (ayni / nakdi / Yeşil Kart) sosyal yardım alan işsizlerin iş arama davranışlarının bozulduğunu (yani iş aramadıklarını) ortaya koyarken, bunun sebebinin yardımların koşullu veya sınırlı olmaması olarak belirtmektedir. Yakut (2015) hanenin elde ettiği toplam karşılıksız yardım miktarı ile 15-54 yaş arası hane reisi erkek bireylerin çalışma saati kararları arasında negatif bir ilişki olduğunu ve etkinin görece daha fakir hanelerde daha büyük olduğunu ortaya koymaktadır.

Anılan çalışmalar, Türkiye İstatistik Kurumu (TÜİK) tarafından hanehalkı ve birey bazında derlenen veri setlerini (Gelir ve Yaşam Koşulları Anketi- GYKA ve Hanehalkı Bütçe Anketi-HBA) kullanarak ekonometrik yöntemler ile analiz yapmaktadırlar. Ancak, bireylerin daha az çalışmaları, işgücü piyasalarında emek arzının azalmasına ve ücretlerin değişmesine neden olacaktır. Değişen üretim maliyetleri hem üretim faktörlerinin (emek, sermaye, toprak) hem de mal ve hizmetlerin fiyatlarını değiştirecektir. Ücretler, hanehalkı kullanılabilir gelirini ve dolayısıyla özel tüketim harcamalarını ve ithalat talebini etkileyecektir. İç ve dış ticari faaliyetlerde yaşanan bu gelişmeler ve değişen emek gelirleri nedeniyle devletin ve Sosyal Güvenlik Kurumunun (SGK) sırasıyla gelir vergisi ve sosyal güvenlik gelirleri ve dolayısıyla bütçe açıklarının değişmesine ve hükümetin borçluluğunun değişmesine neden olabilecektir. Tüm bu birbiri içerisine geçmiş karmaşık süreçlerin kendi içerisinde tutarlı bir şekilde modellenebilmesi için en uygun araç hesaplanabilir genel denge (HGD) modelleridir.

Bu modeller, karar alıcı birimlerin davranışsal özelliklerinin belirli fonksiyonel yapılar ile ifade edilmesi ve bu yapıyı tanımlayan parametrelerin ekonominin veri bir zamandaki durumu kullanılarak elde edilmesinin ardından, sayısal çözümler almayı sağlayan modellerdir. Çözüm algoritması, ana akım iktisat modellerini takiben, göreli fiyat hareketlerinin tüm piyasalarda (mal ve hizmet, faktör) arz-talep dengesinin sağlanmasının temel aracı olduğu hipotezine

dayanmaktadır. Tüm karar alıcıların problemleri eş anlı olarak çözülür ve göreli fiyat (mal ve hizmet, ücretler, faiz, döviz kuru vb. gibi) hareketleri içseldir. Bu yapı, mikro düzeydeki kararların makro düzeydeki etkilerinin de elde edilmesine izin vererek ekonomik sorunların çözümüne bütüncül bir yaklaşım olanağı sunmaktadır. Dışsal kabul edilmiş değişken veya parametre değerlerinden bir veya birkaçının eşanlı olarak değişmesinin etkilerini analiz etmeye imkân vermeleri nedeniyle, etki analizi yapılmasında ve farklı politika değişiklikleri önerilerek etkilerinin incelemesinde güçlü birer araçtır.

Tez çalışmaları kapsamında oluşturulan HGD modeli, çok hanehalklı, çok sektörlü zamanlararası bir küçük açık ekonomi modelidir. Tasarruf kararları, gelir kaynakları, ikamet yerleri (kır / kent) gibi kıstaslara göre oluşturulmuş yedi farklı hanehalkı grubu bulunmaktadır. Modelin üretim yapısı, her bir sektörün tek bir ürün ürettiği, yatırım kararları açısından farklılaştırılmış iki gruptaki 11 sektör ile ifade edilmiştir. Sektörler, HBA kullanılarak elde edilen özel tüketim yapısı ile uyumlu olacak şekilde seçilmiştir. Model ekonomide bunların yanı sıra devlet, SGK ve dış âlem hesapları bulunmaktadır. Küçük açık ekonomi varsayımı, ülkenin dünya fiyatlarından uluslararası ticaret faaliyetlerine dâhil olduğunu ve gerek arz gerekse talep yoluyla fiyatları değiştiremeyeceğini belirtmektedir. Zamanlararası modellerde, karar alıcı birimler ekonomik ömürlerinin ne kadar olduğunu bilirler ve tüm kararlarını, herhangi bir belirsizliğin bulunmadığı varsayımı altında, mal ve hizmet fiyatları ile faktör fiyatlarının tüm zaman serilerini bilerek verirler. Gelir dağılımı gibi, politika etkilerinin görece küçük ancak kesinlikle uzun erimli olacağı konularda, zaman boyutu modelin önemli özelliklerinde birisini oluşturmaktadır.

Oluşturulan model, Türkiye ekonomisi için yapılmış önemli sayıdaki HGD çalışmalarına ve genel olarak gelir dağılımını HGD yöntemi ile analiz eden yazına çeşitli katkılar sunmaktadır. Bunlar şu şekilde sıralanabilir.

- Model ekonomi, yazında ilk kez, hanehalklarını tasarruf edenler ve etmeyenler olarak ikiyi ayırmaktadır. Genelde dinamik rassal genel denge yazınında kullanılan bu ayrım, tasarruf yap(a)mayan hanehalklarının toplam nüfus içerisinde önemli bir paya sahip olduğu ülkelerde, gelirlerinin tamamını tüketerek ekonomik büyümenin kalıcı olmasını sağlayabilirler, Gali vd. (2004). Yazında bu hanehalkları "Ricardocu olmayan" olarak tanımlanmaktadır. Bununla birlikte anılan hanehalkı kümesinde yer alan dört tip hane-

halkı da kendi aralarında emek arzı kararının olup olmaması ve bazı gelir türlerine sahip olmamak yönlerinden farklılaştırılmıştır.

- Genel yazına ikinci temel katkı, kırdan kente göç olgusunun bireylerin emek arzı kararlarının içsel olduğu bir yapı altında modellenmiş olmasıdır. Harris-Todaro yaklaşımına dayanan klasik iç göç mekanizması, kentsel kesimde işsizlik yok var sayıla-rak, tüm ücretler arz ve talep denkliğini teminen içsel olarak çözülecek şekilde değiştirilmiştir.
- Türkiye ile ilgili yazına yapılan katkıların en başında, kalibrasyon sürecinin hanehalkı düzeyinde çeşitli veri setleri kullanılarak gerçekleştirilmesidir. Bunlar Hanehalkı Bütçe Anketi ve Hanehalkı İşgücü Anketi'dir. Birinci anket, nüfus içerisindeki paylar, gelir türleri içerisindeki paylar, tüketim harcamalarının mal ve hizmetler arasında dağılımı vb. gibi hane düzeyindeki değişkenlerin, ikinci veri seti ise emek piyasasına ilişkin değişkenlerin elde edilmesinde kullanılmıştır. Bununla birlikte, yine TÜİK tarafından yürütülen Yıllık Sanayi ve Hizmet İstatistikleri Anketine ait özet istatistikler de yatırımların sektörel dağılımı verilerini derlemek için kullanılmıştır.
- Türkiye ekonomisi için yapılmış HGD çalışmalarının içerisinde, modelin sonuçlarını hane düzeyindeki veri setlerinin yeniden analizinde kullanan, bildiğimiz kadarıyla, ilk çalışmadır.
- Bir diğer önemli katkı, emek piyasasının modellenmesinde emek piyasası katmanlaştırması (*labor market segmentation*) - çalışanların kayıtlı ve kayıtdışı çalışanlar olarak ayrıştırılması - yerine, kayıtlı çalışanların kendi aralarında sahip oldukları eğitim düzeyi ile tanımlanmış vasıf farklarına göre de ayrıştırılmasıdır. Bu nedenle çalışmada kullanılan her bir emek piyasası bir tabaka (*stratum*) olarak adlandırılmıştır.

Türkiye, üyesi olduğu Ekonomik İşbirliği ve Kalkınma Teşkilatı (OECD) üyeleri arasında gayri safi yurtiçi hasılasına (GSYİH) oranla en düşük sosyal harcama yapan ülke konumundadır; 2012 yılı OECD ortalaması %21,5 iken, Türkiye'de bu oran %12,3'tür. Bu tezde ilk olarak, devletin karşılıksız transfer bütçesinin GSYİH'ya oranının %20 oranında arttırılmasının etkileri incelenmiştir. Burada amaç, politika çerçevesinde (transferlerin koşulsuz ve zaman kısıdı olmaksızın ödenmesi) bir değişiklik yapmaksızın, artan transferlerin mikro (hanehalkları ve sektörler) ve makro (bütçe açığı, dış ticaret açığı, GSYİH) düzeydeki etkilerinin incelenmesidir. Sonuçlar, kayıtlı vasıfsızların ve kayıtdışı çalışan ücretlilerin emek arzlarını azalttıklarını göstermekte ve Şeker (2011) ve Yakut (2015) sonuçlarını desteklemektedir.

İkinci olarak, Kasım 2008'de 5510 Sayılı Kanun ile yürürlüğe giren istihdam teşvikleri paketi irdelenmiştir. Anılan program, kayıtlı istihdamı arttırması karşılığında, işveren tarafından ödenen sosyal güvenlik katkı payında 5 yüzde puan indirime gidilmesini öngörmektedir. Bu tezde ise, sektörleri bu şekilde tek tip olarak değerlendirmek yerine sektörel indirim oranı, sektörün toplam kayıtlı vasıfsız istihdamı içerisindeki payının pozitif bir fonksiyonu olacak şekilde içsel olarak çözülmüştür. Sonuçlar, gerek iç göç mekanizması gerekse politika tasarımı nedeniyle, beklenenin aksine kayıtlı vasıflı ve kayıtdışı çalışanların istihdamında artışlara sebep olmuş, toplam istihdam içerisinde kayıtdışılık artmıştır.

Tezin planı şu şekildedir. İkinci bölüm, Türk refah rejiminin mevcut durumu ve tarihsel gelişimine ilişkin bilgileri ele almaktadır. Burada, Türkiye için mikro veri setleri kullanılarak yapılmış çalışmalara ilişkin bir özet de sunulmaktadır. Üçüncü bölüm HGD yaklaşımı ile gelir dağılımını inceleyen yazına ait bir özeti ve kullanılan model ekonominin matematiksel yapısını, dördüncü bölüm ise sayısal analizler için gerekli verilerin derlenmesi, Sosyal Hesaplar Matrisi'nin (SHM) oluşturulması ve ilgili parametrelerin kalibrasyon sürecini ele almaktadır. Ek A'da içsel değişkenlerin listesi, Ek B'de üçüncü bölümde özet olarak sunulan yazına ait ayrıntılar, Ek C'de kalibrasyon sürecine ilişkin matematiksel ayrıntılar ve ispatlar ve Ek D'de de HBA ve Girdi-Çıktı Tablosunda kullanılan toplulaştırma anahtarları sunulmaktadır. Beşinci bölüm analiz sonuçlarına ve gelir dağılımı etkilerine, Ek E ise modelin temel patikasına ilişkin ayrıntılara ayrılmıştır. Altıncı bölümde sonuçlar genel olarak tartışılmış, ilerleyen dönemler için araştırma gündemi hakkında bilgi verilmiştir.

### *Türk Refah Rejimi*

Yazında refah devleti, refah rejimi ve sosyal politika terimleri birbirlerinin yerine geçer nitelikte kullanılmakla birlikte, aralarında temel farklar bulunmaktadır. Esping-Andersen (1990), dar anlamıyla refah devletini gelir transferleri, sosyal hizmetler ve barınma yardımlarının varlığı ile tanımlar. Geniş tanımıyla refah devleti ise meselenin politik ekonomi boyutuyla ilgilidir; devletin emek piyasasında yaptığı düzenlemeler ve diğer politikaları aracılığıyla genel ekonomi üzerinde önemli etkileri bulunmaktadır. Bu bağlamda refah devleti, refahın üretiminden ve dağıtımından sorumludur. Ancak, özellikle 1980 ve sonrasında yaşanan serbestleşme ile devletin yanı sıra özel kesimin de refah üretimi sürecine dâhil olması, refah devleti teriminin yetersiz kalmasına neden olmuştur. Bu nedenle, her iki kesim tarafından birbirine bağımlı

bir şekilde üretilen refahın devlet, piyasa ve aile arasında paylaşılması olarak tanımlanan refah rejimi kavramı ortaya çıkmıştır (Esping-Andersen, 1999; 34-5). Diğer yandan sosyal politika, kamu kaynakları ile finanse edilen ve kamu otoriteleri tarafından yönetilen ve sosyal riski azaltmak için uygulanan politikaları tanımlamaktadır. Buğra ve Keyder (2005b)'e göre sosyal politikalar, bireylerin eşit haklarla ve özgür bir şekilde toplumun bir üyesi olmasını sağlamaya çalışırlar ve yardımseverlik ve özel / kayıtdışı yardımlaşma ağları bu politikaların kapsamı dışındadır[1].

Dünyada refah rejimi uygulamaları, 19. yüzyılın sonlarında Bismarck Almanya'sında başlamıştır ve onu 20. yüzyıl başlarında Birleşik Krallık takip etmiştir. Ancak, 2. Dünya Savaşı sonrası dönemde ortaya çıkan toplumsal etkiler ile baş edebilmek için hazırlanan ve Kasım 1942'de yayınlanan Beveridge Raporu, sadece Birleşik Krallık'da değil, hâlihazırda yürütülen reform çabalarına da ışık tutar niteliktedir. Rapor hükümete, vergi sisteminden ayrı olarak prim sistemi ile finanse edilen ve kapsamlı sağlık ve rehabilitasyon hizmetleri sunan bir sosyal güvenlik sistemi kurulmasını ve tam istihdamın sağlanmasına yönelik politikalar uygulanmasını önermektedir.

Anılan rapor, 1970'li yıllara kadar yürütülen refah devleti uygulamalarının şekillenmesini sağlamıştır. Ancak 1974 petrol krizi ile başlayan durgunluk içinde enflasyon (*stagflation*) dönemini, 1980'li yıllarda önce ticaretin daha sonra finansal sermaye akımlarının serbest bırakılması ve 1990'larda ise hızlanan küreselleşme süreci izlemiştir. Tüm bunlara koşut olarak gerçekleşen teknolojik ilerlemeler, üretim yapısının sanayi-inşaat ekseninden hizmetlere doğru kaymasına neden olmuştur. Bu durum, vasıfsız / düşük vasıflı bireylerin istihdam edilmelerini, kadınların işgücüne katılımlarındaki artış ve emek piyasası düzenlemelerinde katılıklar ile güçlü sendikaların varlığı emeğin sektörler arasında yer değiştirmesini zorlaştırmıştır. Bu duruma, Hollanda, Danimarka, İsveç ve Finlandiya gibi ülkelere emek piyasası esnekliği ve kişilerin vasıflarını geliştirerek beşeri sermaye birikimi sağlamalarını temin edecek politikalar uygulamaya başlamışlardır. Yazında bu politika demeti, güvenceli esneklik olarak anılmaktadır. Bu politikaların bir ayağı istihdamın kısa süreli iş akitleri ile sağlanmasını,

[1] Bu tez sosyal transfer harcamalarının gelir dağılımı etkilerine odaklandığı için sosyal politikanın diğer alanlarında yaşanan gelişmelere değinilmeyecektir. Sosyal güvenlik sisteminde yapılan reformların ayrıntılarına ve ardışık nesiller yaklaşımı ile HGD analizi için Değer (2011), sağlık sistemi reformları için Hone vd. (2016)'ya bakılabilir. Bununla birlikte, bu politikaların yoksulluk ile ilişkisi de kapsam dışında bırakılmıştır. Türkiye için bu konuda yapılmış ekonometrik analizler için bkz. Şeker ve Dayıoğlu (2015) ve Şeker ve Jenkins (2015).

diğer ayağı ise işini kaybetmiş bireylerin aktif emek piyasası politikaları ile desteklenmesini öngörmektedir ve bu kapsamda sosyal transfer programlarında reforma gidilmiş, katılım ve program maliyetleri düşürülmüştür.

Esping-Andersen (1990), dünyadaki refah devletlerini muhafazakâr, liberal ve sosyal-demokrat olarak üç ana gruba ayırmaktadır. Muhafazakâr refah devleti, ailenin sosyal politikaların temelinde olduğu ve emek piyasasındaki statü farklılıklarının korunmasını benimseyen Kıta Avrupası modelini; liberal refah devleti bireylerin hayatlarını idame ettirmek konusunda birincil sorumlu olduğu, düşük miktarlar ödenen sosyal yardım programlarına katılımın zor olduğu uygulamaları tanımlamaktadır. Bunlara karşılık sosyal-demokrat refah devleti, üretilen refahın sosyal statü farkları gözetmeksizin herkes için yüksek hayat standardı sunacak şekilde bireyler arasında paylaştırıldığı uygulamaları ifade etmektedir. Yazar, çeşitli sebeplerle bu sınıflamaya uymayan başka örnekler nedeniyle eleştirilmiş ve 1999 yılındaki ikinci çalışmasında "dördüncü dünya" başlığı altında diğer sistemleri incelemiştir. Burada, Türkiye'nin de aralarında bulunduğu Güney Avrupa veya Akdeniz modeli olarak anılan model öne çıkmaktadır. Yazar bu modeli, aileyi temel alan ancak sosyal yardımların koruma ve refah düşüşüne engel olmak için değil kayırmacılık temelinde yapılması nedeniyle bir "refah rejimi" olarak değil, bir "refah sistemi" olarak tanımlamaktadır.

Güney Avrupa modelinde kişiler vasıfları gereği değil kayırmacılık anlayışı ile kamuda istihdam edildikleri için sektörün verimliliği düşük kalmaktadır. Geç sanayileşme nedeniyle küçük aile işletmeleri ve kendi hesabına çalışanların istihdamı toplam içinde önemli bir paya sahiptir. Kayıtdışı olarak geçici işlerde yevmiyeli olarak çalışmak yaygındır. Cinsiyet eşitsizliği, hem ücret hem de çalışma koşullarında önemli farklılıklara yol açarken, vasıflılar ile vasıfsızlar arasında büyük bir ücret uçurumu bulunmaktadır. Sosyal güvenlik sistemi, yoğun kayıtdışılığa paralel olarak, kamu kaynakları ile finanse edilen programlar aracılığıyla sağlanmakta ve geniş kitleleri kapsamaktadır. Sosyal politikalarda aile temel alınmakta ve kadına çocuk ve yaşlı bakımında başrol uygun görülmektedir. Yerel hükümetlerin, yardım kuruluşlarının ve dini kurumların sağladıkları yardımlar yoksulların gelirlerinde önemli bir yer tutmaktadır.

Buğra ve Keyder (2003) Türkiye'nin Güney Avrupa modeli ile benzerlikleri bulunduğunu ancak AB müktesebatına uyum sürecinin uygulamaları AB'nin ortak refah politikalarına yak-

laştırdığını vurgulamaktadır. Grütjen (2008)'e göre Türkiye, sivil toplumun, piyasa güçlerinin ve bölgesel otoritelerin etkisi ve evrensel değerler ile oluşturulmuş sağlık sistemine sahip olma dışında, Güney Avrupa modeli için "ideal" bir örnektir. Bunlara karşılık Aybars ve Tsarouhas (2010), Türk refah sisteminin, Güney Avrupa modeli ile ideolojik ve toplumsal yapıda dini motiflerin baskın olduğu ve cinsiyet eşitsizliğinin eğitim ve istihdamda yüksek olduğu Orta Doğu modelinin bir karması olduğunu ileri sürmektedir. Yazarlar, AB etkisinin Türk sistemini dönüştürdüğünü ancak nihayetinde katıksız bir Güney Avrupa modeli olacağını belirtmektedirler.

Türkiye'de refah sistemi, 1950'li yıllarda kamu çalışanları için Emekli Sandığı isimli sosyal güvenlik kurumunun kurulması ile başlamaktadır. Bunu, 1960 ve 70'li yıllarda Sosyal Sigortalar Kurumu ve Bağ-Kur izlemiştir. Ancak ekonomik krizler, yüksek kayıtdışılık ve buna bağlı olarak primsiz programlara (Yeşil Kart gibi) katılımdaki artışlar kurumların bütçe dengelerini bozmuş, merkezi hükümet bütçesinden yapılan transferler ciddi miktarlara ulaşmıştı. Bunun üzerine, 1990'ların sonunda emeklilik yaşının yükseltilmesi ile başlayan reform çalışmaları, 2006 yılında üç kurumun Sosyal Güvenlik Kurumu (SGK) adıyla birleştirilmesi ile devam etmiştir. Ülkenin ilk sosyal yardım programı 1976 yılında, sosyal güvencesi, gelir getirici mülkü veya başka geliri olmayan ve bakımını sağlayacak yakın akrabası bulunmayan 65 yaş ve üzeri kişileri kapsayan yaşlılık aylığıdır. İlk sosyal hizmet kurumu olan Sosyal Hizmetler ve Çocuk Esirgeme Kurumu ise 1983'de faaliyete geçmiştir.

Sosyal Yardımlaşma ve Dayanışmayı Teşvik Fonu (SYDTF) 1986 yılında Başbakanlığa bağlı olarak faaliyete geçmiş, ilçe ve illerde ise mülki amirlerin başkanlıklarını yürüttükleri Sosyal Yardımlaşma ve Dayanışma Vakfı olarak örgütlenmiştir. 55 farklı kurum-müdürlük-başkanlık tarafından yürütülen sosyal politikalar (Yentürk, 2013), 2011 yılının Haziran ayında Aile ve Sosyal Politikalar Bakanlığı'nın (ASPB) kurulması ile tek çatı altında toplanmıştır. Tek elden yürütülmeyen sosyal politikalar, kamu kaynaklarının kullanımı ve hesap verilebilirlik gibi konularda şeffaflığı önlediği gerekçesiyle eleştirilmiş (Buğra ve Adar, 2007) ve kurumların politik sebeplerle önyargılı olmakla suçlanmalarına sebep olmuştur (Şenses, 2010).

Son 10 yılın sosyal yardım programları, seçim dönemlerinde yardımların artması ve yardım alacak ailelerin kayırmacılık yoluyla seçilmeleri gibi konularda eleştirilmektedir. OECD (2012) verilerine göre Türkiye'de, Meksika ve Portekiz'in ardından, en zengin %20'lik nü-

fus toplam nakdi transferlerden (emekli maaşları dâhil) en yüksek payı almaktadır. Balaban (2014), Türkiye'nin GSYİH içerisindeki payı artan sosyal harcamalarına rağmen yoksulluğu azaltma performansının AB üyesi devletlere göre sönük kaldığını ortaya koymaktadır.

Uzun yıllar hanehalkı düzeyinde Türkiye temsili olacak şekilde toplanan istatistikler bulunmamaktaydı. 1980 öncesi dönemde bazı akademisyenlerin kişisel çabaları ve (bugün Kalkınma Bakanlığı olan) Devlet Planlama Teşkilatı tarafından yürütülen araştırmalara göre 1980'lerin ortalarına kadar Gini katsayısı 0,5 ve üzerinde seyretmekteydi. 1987'de TÜİK (o dönemki adıyla Devlet İstatistik Enstitüsü) tarafından ilk kez yürütülen Hanehalkı Gelir ve Harcama Anketi sonuçlarına göre ise 0,43 düzeyine gerilediyse de 1994'de 0,49 ve 2002 yılında 0,42 olarak gerçekleşmiştir, (Yükseler, 2005). 1960'lı yıllarda uygulamaya konulan artan oranlı vergileme sistemi, kişisel gelir dağılımına pozitif katkılar yapmış olmakla birlikte, 70'li yıllar boyunca yüksek enflasyona rağmen vergi dilimlerinin güncellenmemesi ve 1980 sonrası dönemde sağlanan muafiyet ve istisnalar nedeniyle etkisini yitirmiştir. Boratav ve Yeldan (2001), ithal ikameci dönemdeki sanayi ve bankacılık sektörlerinin oligopolistik yapıları ve nüfusun büyük bölümünün kırda düşük verimli tarım sektöründe çalışmalarının gelir eşitsizliğinin tarihsel nedenleri olduğunu, 1980 sonrası uygulanan ihracata dayalı büyüme döneminde ise vergi kolaylıklarının sektörlere kayırmacılık temelinde sağlanmasının gelir dağılımını daha da bozduğu belirtmektedir. Özmucur (1996) da 1968-1994 döneminde ücretlerin milli gelir içerisindeki payının azalmasıyla gelir dağılımında bozulmaya ilişkin gözlemler sunarken Güneş (2007), 1987-2005 dönemi için kayda değer bir değişim yaşanmadığını ileri sürmektedir. Filiztekin (2015), 2007 yılına kadar grup-içi gelir eşitsizliklerinin azaldığı ve gelir dağılımının düzeldiği ancak küresel finans krizinin de etkisiyle bu eğilimin tersine döndüğü sonucuna varmaktadır. Yazar ayrıca, aile reisinin eğitim düzeyi ve çalıştığı sektörün gelir dağılımının temel belirleyicileri olduklarını ortaya koymaktadır.

ASPB verilerine göre 2015 yılında 3 milyon hane düzenli veya bir kereye mahsus olarak verilen gıda, yakıt gibi yardımlardan yaralanmaktadır. 2013-15 döneminde toplam sayı görece sabitken, geçici yardımlardan yararlananların sayısında azalma eğilimi görülmektedir. Hanehalkı düzeyinde verilerle yapılan çeşitli çalışmalar, toplam kamu transferlerinin varsıl haneler lehine çarpık bir şekilde dağıtıldığı ve toplam hane geliri içerisinde bu gelirlerin payının çok düşük olduğu konusunda hem fikirdirler. Ancak bunlara rağmen, çeşitli analizler bu transferlerin gelir dağılımına düzeltici etkiler yaptıklarını ortaya koymaktadır. Gürsel vd. (2000)

transferler-sonrası Gini katsayısının öncesine göre %5,3 daha düşük olduğunu belirtmektedir. Bu kapsamda Yakut-Çakar vd. (2012), Başlevent (2014), Bahçe ve Köse (2014) ve Şeker ve Dayıoğlu (2014) çalışmaları incelenebilir.

***Model Ekonomi***

Belirli bir zaman dilimi içerisinde yaratılan gelirin bireyler, değişik sosyo-ekonomik gruplar ve üretim faktörleri arasında paylaşılmasına "gelir dağılımı" denir. Tanımsal farklılıklar, bilimsel çalışmanın amacı ve kullandığı teorik yaklaşıma göre önem kazanmaktadır. Gelirin üretim faktörleri arasında dağılımı (emek ve sermaye) veya çeşitli sosyo-ekonomik gruplar (meslek, sektör, bölge, eğitim durumu vb. gibi) arasındaki dağılımına fonksiyonel gelir dağılımı denir. Buna karşılık tüm iktisadi süreçlerin sonucunda ortaya çıkan bireysel gelir dağılımının incelenmesi, farklı karar alıcı birimlerin birbirleriyle olan ilişkilerinin matematiksel olarak kendi içinde tutarlı bir yapıda kapsamlı bir şekilde ifade edileceği bir modelleme gereksinimini ortaya çıkarmaktadır. HGD modelleri, bu ihtiyacı karşılayan güçlü bir araçtır.

Gelir dağılımını HGD yaklaşımı ile analiz eden çalışmalar, temelde iki gruba ayrılırlar. Birinci grupta, temsili karar alıcı birim, yani bir kişinin probleminin çözümünün, kendisi ile benzer niteliklere sahip tüm kişilerin probleminin çözülmesi ile eş anlamlı olduğu varsayımı yapmaktadırlar. Bu modeller, oluşturulan birden fazla sayıda hanehalkı (örneğin kırda yaşayanlar, kentte yerleşik kayıtdışı çalışanlar vb. gibi) grubu arasındaki gelir dağılımını analiz edebilirler. İkinci gruptaki çalışmalar ise bazı açılardan aynı niteliklere haiz hanehalklarının tamamen türdeş olduklarının varsayılamayacağını ileri sürmekte ve mikro-benzetim (microsimulation) yöntemi ile HGD yöntemini bir araya getirmektedirler. Burada iki alternatif bulunmaktadır. Birincisi, hane veya birey düzeyinde var olan ayrıntılı veri setinde yer alan birey ve/veya hanelerin tamamı HGD modeli içerisinde kullanılmaktadır. Bu, oldukça büyük ve karmaşık bir algoritmanın yazımını gerektirmektedir. İkinci yöntemde ise temsili karar alıcı birim varsayımı ile oluşturulmuş HGD modeli, mikro veri setinde yer alan tüm birey ve/veya hanelerin gelir yaratma mekanizmalarının ekonometrik yöntemlerle tahmin edildiği ayrı bir modül (bundan böyle kısaca MSM) ile birlikte çalıştırılmaktadır. Yazında izlenen yol, önce HGD modülünün çalıştırılması, elde edilen fiyat (faktör ve mal ve hizmet fiyatları) vektörlerinin MSM modülüne uygulanarak gelir dağılımındaki değişimin incelenmesidir. Bu yaklaşım, MSM sonuçları HGD modülünde tekrar kullanılmadığı için eleştirilmektedir ve her

iki modülü belirli bir noktaya yakınsayıncaya kadar sıralı bir şekilde çalıştıran çalışmalar da mevcuttur. MSM-HGD yaklaşımında, iki ayrı modülün çalıştırılması yerine, HGD modelinin sonuçlarının mikro veri setine doğrudan uygulanması yoluna da gidilebilmektedir. Burada, HGD modelinde kullanılan temsili hanehalklarının her biri için, grup-içi gelir dağılımının belirli bir istatistiksel formda olduğu varsayımı altında, grup-içi gelir dağılımdaki değişim incelenmektedir. Lofgren vd. (2003) ve ilgili yazının ayrıntılı bir analizini sunan Davies (2009), bir fonksiyonel form atamaksızın yapılan mikro-benzetimin, tüm hanehalklarının HGD modelinde kullanılmasına daha yakın sonuçlar verdiğini ortaya koymaktadır.

Bu tezde, temsili Ramsey-türü (sonsuz ömürlü) hanehalkı varsayımı yapılmış ancak kalibrasyon sürecinde mikro veri setlerinden ayrıntılı bir şekilde yararlanılmıştır. Bununla birlikte, ayrıntıları aşağıda sunulacak olan model ekonomide, hem göç nedeniyle beşeri yapı-da hem de emek piyasasının emek türlerine göre kompozisyonunda gerçekleşen değişimler nedeniyle, yukarıda anlatılan mikro-benzetim çalışması yapılamamıştır. Bu, ayrıntılı bir ekono-metrik ve istatistiksel analizler gerektirdiği için, yöntem itibariyle, bu tezin kapsamı dışındadır.

Model ekonomide hanehalkları, kırda yerleşikler (RH), kentte yerleşik kendi hesabına çalışanlar ve işverenler (CH), kentte yerleşik vasıflı (üniversite ve üzeri eğitimli) kayıtlı çalışanlar (SF), kentte yerleşik vasıfsız (lise ve daha az eğitimli) kayıtlı çalışanlar (USF), kentte yerleşik kayıtdışı çalışanlar (IW), kentte yerleşik emekliler (RET) ve kentte yerleşik transfer geliriyle geçinenler (TRF) olarak yedi gruba ayrılmıştır. Hanehaklarının problemi, kompozit tüketimin ve kompozit emek arzının belirlendiği birinci aşama ile bu seçimlerin sırasıyla mal ve hizmetler ve sektörler arasında ayrıştırıldığı ikinci aşamadan oluşmaktadır.

RH, CH ve SF grupları, kompozit tüketim ve kompozit emek arzını seçerek zamanlararası faydalarının indirgenmiş bugünkü değerini maksimize etmeye çalışan ve kısaca Ricardocu olarak tabir edilen hanehalklarıdır. Bu hanehalkları, emek geliri, firmalardan temettü geliri ve devletten ve SGK'dan karşılıksız transfer geliri elde etmekte, devlete gelir vergisi, SGK'ya sosyal güvenlik primi ödemektedir ve harcanabilir gelirlerini tüketim ve tasarrufa ayırmaktadırlar. Diğer dört hane halkı ise Ricardocu olmayan hanehalklarıdır. Ortak özellikleri, temettü geliri elde etmemeleri ve tasarruf kararlarının olmayışıdır. Buna karşılık bu dört hanehalkı, bütçe kısıtlarındaki farklılık ve emek arzı kararlarının varlığına göre yekpare değillerdir. USF, emek geliri ve her iki kaynaktan transfer geliri elde ederken gelir vergisi ve sosyal güvenlik primi

ödemektedir. IW, emek geliri ve devletten karşılıksız yardım geliri elde etmekte ancak herhangi bir vergi ve prim yükümlülüğü bulunmamaktadır. RET, sadece SGK'dan transfer geliri elde ederken, TRF her iki kaynaktan da transfer geliri elde etmektedir. Ricardocu olmayan hanehalkları, kompozit tüketim ve kompozit emek arzı (USF ve IW için) seçerek zaman-içi faydalarını maksimize etmeye çalışmaktadırlar.

İkinci aşama iki alt aşama barındırmaktadır. Birinci alt aşamada haneler, seçtikleri kompozit tüketimi mal ve hizmetler arasında ayrıştırmaktadır. Burada hanelerin, Doğrusal Harcama Sistemi olarak anılan ve hanelerin öncelikle geçimlik tüketimlerini yaptıkları, daha sonra ellerinde kalan bütçe ile mal ve hizmet bazında tüketime karar verdikleri varsayılmaktadır. İkinci alt aşamada ise, seçilen kompozit emek arzı, sektörlerin birbirlerinin eksik ikamesi oldukları varsayımı altında sektörler arasında paylaştırılır, yani hane halkları hangi sektöre ne kadar emek arz edeceklerine karar verirler. Birinci alt aşamada, dönem-içi bir fayda maksimizasyonu yapılırken, ikinci alt aşamada amaç, toplam emek gelirlerini maksimize etmektir.

Firma ve üretim yapısı, HBA'dan elde edilen özel tüketim harcamaları ile uyumlu olacak şekilde oluşturulmuştur. Burada da temsili karar alıcı birim olarak tek bir firmanın aynı sektördeki tüm firmaları temsil edeceği varsayılmış ve sektör ve firma terimleri birbirinin yerine geçer nitelikte kullanılmıştır. Sektörler yatırım kararlarına göre iki gruba ayrıştırılmıştır. Birinci grupta yer alan sektörler, yatırım kararlarını firmanın indirgenmiş bugünkü değerini maksimize edecek şekilde yatırımı, sermaye stokunu ve kompozit emek talebini seçmektedirler. Bunlar Tarım (AGR), Gıda, İçecek ve Tütün (FBT), Tekstil (TEX), Hane ve Konut (SHE), Taşımacılık (TRP) ve Diğer Hizmetler (OSER) sektörleridir. İkinci grupta yer alan sektörler ise dönem-içi kâr maksimizasyonu yaparak kompozit emek talebini seçmektedirler ve her dönem GSYİH'nın belirli bir oranı kadar yatırım harcaması yapmaktadırlar. Bunlar Madencilik, Kömür ve Petrol Ürünleri (MCP), Dayanıksız Tüketim Malı Üretimi (HNDG), Dayanıklı Tüketim Malı Üretimi (HDG) ve İnşaat (CON) sektörleridir. Bunların yanı sıra, sermaye stoku sabit kabul edilmiş Kamu Hizmetleri (PSER) sektörü bulunmaktadır.

Sektörler, sektörel kompozit emek taleplerini, emek türlerinin birbirlerinin eksik ikamesi oldukları varsayımından hareketle, toplam emek maliyetini minimize edecek şekilde emek türleri arasında ayrıştırmaktadırlar. Sektörel katma değer, sektörel sermaye stoku ve sektörel kompozit emeğin sabit ikame esnekliği (*constant elasticity of substitution*-CES) fonksiyonu

olarak, sektörel çıktı ise katma değer ve ara girdilerin birbirlerinin tamamlayıcısı oldukları Leontief türü bir üretim fonksiyonu ile üretilmektedir.

SHE ve PSER hariç tüm sektörlerin ürettikleri mallar ihracata konu olmaktadır. Üretimin iç piyasaya ve sabit dünya fiyatlarından ihracata ayrılacak kısmı, firmanın kar maksimizasyonu ile belirlenmektedir. SHE, PSER ve CON sektörlerinin ürettikleri mallar ise ithal edilmemektedir. Yurtiçinde tüketilen (ara girdi, özel tüketim, kamu tüketimi ve yatırım malı) malların, yurtiçi üreticiler tarafından üretilen mallar ile ithal edilen malların bir CES bileşimi olduğu varsayılmıştır. Tüketiciler, maliyet minimizasyonu problemi ile tüketimlerini ithal ve yerli mallar arasında ayrıştırmaktadır.

Modelde tüm üretim faaliyetlerinin sahibi olarak tasarlanmış bir girişimler hesabı bulunmaktadır. Bu hesap, aşınma payı dâhil, tüm sektörel kârları toplamakta, devletten karşılıksız transfer geliri elde etmekte ve kurumlar vergisi ödemektedir. Gelir ve gider arasında kalan miktarı ise hanelere temettü geliri olarak aktarmaktadır. SGK hanehalklarından (sektörlerden) emek gelirleri (brüt emek maliyetleri) üzerinden sosyal güvenlik primi (katkısı) tahsil etmekte, her dönem GSYİH'nın belirli bir oranında da hanelere karşılıksız transferler yapmaktadırlar. Gelir gider fakrı ise merkezi hükümet bütçesinden karşılanmaktadır.

Model ekonomide hükümet, hanehalklarından (sektörlerden) emek gelirleri (brüt üretim değeri) üzerinden gelir vergisi (üretim vergisi), dâhilde ticaretten katma değer vergisi, ithalat işlemleri üzerinden tarife geliri ve sektörel kârlar üzerinden kurumlar vergisi tahsil etmektedir. Hükümetin harcamaları gelirinin belirli bir oranında yaptığı tüketim harcaması, GSYİH'nın belirli bir oranında hanehalklarına transfer, sabit kabul edilen girişimler hesabına transferler ve bütçe açığının kapatılması için SGK'ya transferlerden oluşmaktadır. Bununla birlikte, gelir gider dengesindeki fark, dış borçlanma ile finanse edilmekte ve bu borç stoku üzerinden de dışsal ve sabit kabul edilmiş dünya faiz oranında dış borç faiz ödemesi gerçekleştirmektedir.

Emek piyasasında denge, her bir hanehalkının her bir sektöre yapacağı emek arzı ile her sektörün ilgili hanehalkının emeğine olan talebinin eşitlenmesi durumudur. Modelde, beş hanehalkı 11 sektör bulunduğu için 55 emek piyasası tabakası bulunması planlanmıştı ancak şu üç nedenle 52 adet tabaka bulunmaktadır. Kamu hizmetleri sektörü işveren istihdam etmeyeceği gibi bireyleri kayıtdışı olarak da çalıştırmamaktadır. Bununla birlikte, kırda yerleşik kamu çalışanları da vasıflı yahut vasıfsız bireyler oldukları için, RH grubunun PSER sektöründe is-

tihdam edilmeyeceği varsayılmış, ilgili emek arz ve talepleri PSER hizmetlerinin SF ve USF istihdamları arasında paylaştırılmıştır.

Finansal piyasaların bulunmadığı HGD modellerinde, nominal döviz kuru, dış ticaret dengesi ve fiyatlar genel düzeyi / reel döviz kuru değişkenlerinden sadece biri içsel olarak çözülebilir. Bu nedenle, nominal döviz kuru ve tüketici fiyat endeksi olarak tasarlanmış fiyatlar genel düzeyi sabit kabul edilerek, dış ticaret dengesi içsel olarak çözülmüştür. Model, reel döviz kurunun sabit kaldığı bir miktar uyumlanması modelidir (Adelman ve Robinson, 1988).

Model ekonominin teorik yapısı sonsuz ömürlü hanehalklarının varlığına dayansa da, sayısal analizlerin yapılabilmesi için modelin sonlu bir ufuk için çözülmesi gerekmektedir. Bununla birlikte, modelin belirli bir dengeye ulaşabilmesini sağlamak için bazı koşullarının dayatılması gerekmektedir ki, yukarıdaki model için üç adet denge koşulu mevcuttur. Bunlar yatırımların yıpranma payına eşit olması, sektörel temettü miktarının firma değerinin faiz oranı ile çarpımına eşit olması ve son dönemde kamu tasarrufunun sıfır olmasıdır.

Ayrıntıları anlatılan model ekonomiye, kırdan kente göç olgusu eklenmiştir. Yazında Harris ve Todaro (1970) tarafından geliştirilen ve sıkça kullanılan mekanizma, göçün kır ile kent arasındaki ücret farklılıkları tarafından tetiklendiğini ancak kırda kalan emek arzı ve kentteki işsizlik tarafından sınırlandırıldığı varsayımına dayanmaktadır. Bu yaklaşımın kentte işsizlik varken göçün neden hâla devam ettiğini açıklamadığını savunan Cole ve Sanders (1985), kentteki üretimi kayıtlı ve kayıtdışı olarak ikiye bölmüş, göç edenlerin bir kısmının ikinci sektörde istihdam edildiklerini varsaymıştır. Hoopengardner (1974) ise Harris-Todaro yaklaşımı ve türevlerindeki işsizliğin istikrarlı dinamik bir dengesizlik (*stable dynamic disequilibrium*) durumu yarattığını ve istihdam oranının sabit kalmasına neden olduğunu göstermiştir. Bu nedenle bu tezde, göç edenlerin bir olasılık (%30) kayıtlı vasıfsız olarak iş bulacakları ya da (%70 olasılıkla) kayıtdışı olarak istihdam edilecekleri ancak işsiz kalmayacakları varsayımına dayalı bir iç göç mekanizması oluşturulmuştur. Bu modelleme stratejisini yazından ayrıştıran temel özellik ise bireylerin emek arzı kararlarının içsel oluşudur. İlgili yazın, Heckman vd. (1998) çalışmasının "emek arzının zamanlararası ikame esnekliği düşüktür" bulgusunu dikkate alarak emek arzını tam esnek olmayan (*perfectly inelastic*) bir şekilde modellemektedir. Ancak bu tezin temel amacı sosyal yardımlar başta olmak üzere kamu politikalarının bireylerin emek piyasası kararları üzerindeki etkileri dâhil olmak üzere gelir dağılımına etki-

lerinin incelenmesi olduğu için, göçün varlığı altında emek arzı kararı içsel olarak modellenmiştir. Göç miktarı, kentte beklenen net reel ücret ile kırdaki net reel ücret farkının ve kırda kalan toplam emek arzının bir fonksiyonu olarak model içerisinde çözülmektedir. Net reel ücret, brüt ücretten gelir vergisi ve sosyal güvenlik primi ödendikten sonra kalan ücreti ifade ederken bu değer, hane grubuna özgü kompozit tüketim malının fiyatı ile indirgenerek reel hale getirilmiştir. Kentte beklenen net reel ücret, kişilerin kayıtlı vasıfsız olarak elde edecekleri net reel ücret ile kayıtdışı çalışan olarak elde edecekleri net reel ücretin ağırlıklı ortalamasıdır ve ağırlıklar her bir grupta iş bulma olasılığıdır.

***Veri ve Kalibrasyon***

Model ekonomi, 2011 yılı verileri kullanılarak kalibre edilmiştir. Burada amaç, fiyatların görece istikrarlı olduğu bir yılın seçilmesidir. Küresel finansal kriz nedeniyle 2008 ve 2009 yılları, düzeltme yılı olduğu için de 2010 yılı yerine, fiyatların görece daha istikrarlı olduğu 2011 yılı seçilmiştir. Bunun bir değer nedeni, 2012 itibariyle bazı bilgilerin (değiştirilen iş, yıl içerisinde çalışılan ay sayısı vb. gibi) HBA'dan çıkarılmış olmasıdır.

HBA-2011'de bulunan toplam 9.918 hane, emek piyasasında görülen çeşitliliği yansıtabilmek için, üç farklı kıstas kullanılarak başlangıçta beş gruba ayrılmıştı, CH, SF, RH, USF ve IW. Bu kıstaslar yaşanılan yer (kır / kent), eğitim durumu (lise ve altı / üniversite ve üstü) ve çalışılan iş nedeniyle sosyal güvenceye sahip olup olmama durumu (kayıtlı / kayıtdışı) olarak seçilmiştir. Bunun için her haneden en az bir aile üyesinin çalışıyor olması gerekmektedir. Eğer hane reisi çalışıyorsa onun, o işsizse hanede diğer çalışanların bilgisi kullanılmıştır. Eğer hane reisi dışında birden fazla hane üyesi çalışıyorsa önce deneyimi çok olan, daha sonra yıl içinde daha uzun süre çalışmış olan, eğer halen birden fazla kişi mevcutsa, yaşlı olan seçilmiştir. Her haneden seçilen bu kişinin kişisel bilgileri (eğitim durumu ve sosyal güvenceye sahiplik) kullanılarak hanenin hangi gruba ait olduğu belirlenmiştir. Örneğin kentte ikamet edip herhangi bir sektörde kayıtdışı olarak çalışan bir hane reisinin olduğu hane IW (kayıtdışı çalışanlar) grubuna atanmıştır. Hane reisi işsizken üniversite mezunu oğlu / kızı herhangi bir sektörde kayıtlı olarak çalışıyorsa, hane SF (kayıtlı vasıflı çalışanlar) grubuna atanmıştır. Bu sürecin sonunda, hanelerin %7,5'inde herhangi bir çalışan bulunmadığı ve hanenin gelir kaynağının ya sadece SGK transferleri olduğu ya da hem SGK'dan hem de devletten transferler olduğu görülmüştür. Bunun üzerine, anılan ilk haneler RET grubuna, ikinci

haneler TRF grubuna atanmıştır. Her hanenin bir gruba atanmasının ardından yapılan analizlerde, Ricardocu hanehalklarının toplam tasarrufların %99,5'ine sahip oldukları görülmüştür. Bu nedenle USF, IW, RET ve TRF grupları Ricardocu olmayanlar olarak belirlenmiş ve tasarrufları SF grubuna aktarılmıştır.

Her bir hanenin bir gruba atanmasının ardından, birey bazındaki gelir ve harcama bilgileri önce hane, daha sonra da grup bazında toplulaştırılmış ve her bir hane grubunun toplam gelir ve her bir gelir kalemi, harcamalar ve nüfus içerisindeki payları hesaplanmıştır. HBA'da bulunan gelirler emek, sermaye / varlık, devletten transferler, SGK'dan transferler ve özel transferler olarak toplulaştırılmıştır. Bununla birlikte, TÜİK tarafından hesaplanan izafi kira gelirleri ve özel transfer HGD modeli içerisinde kullanılamayacağından, kapsam dışında tutulmuştur. TÜİK, hane bazında tüketim harcamalarını Birleşmiş Milletler'in Amaca Göre Bireysel Tüketim Sınıflaması (*Classification of Individual Consumption by Purpose* – COICOP) kullanılarak 14 ana, 198 alt kalemde sunmaktadır. Bu tüketim harcamaları, yukarıda anılan 10 sektör (kamu hizmetleri özel tüketime konu olamayacağı için) olarak toplulaştırılmış ve her bir hanenin toplam tüketim ve her bir mal ve hizmetin toplam hane tüketimi içerisindeki payları hesaplanmıştır. Hanehalklarının, geçimlik tüketim harcamalarını yaptıktan sonra kalan bütçelerini mal ve hizmetler arasında paylaştırdıkları Doğrusal Harcama Sistemi kullanılmıştır. Her bir hane grubunun her bir mal ve hizmetten geçimlik tüketim miktarının hesaplanması için, HBA-2002'de yer alan hanehalkları da yukarıda anlatılan yöntemle gruplara atanmıştır. 2002 ve 2011 yılları arasında her bir mal ve hizmetin reel tüketim harcamasındaki yüzde değişim, toplam reel harcanabilir gelirdeki yüzde değişime bölünerek "tüketimin gelir esnekliği" ve bu esneklikler kullanılarak geçimlik tüketim miktarları hesaplanmıştır.

Sosyal Hesaplar Matrisi (SHM), HGD yazınında sıklıkla kullanılan ve parametrelerin kendi içerisinde tutarlı bir şekilde kalibre edilmesine olanak veren ve tüm ekonominin belirli bir zaman noktasındaki muhasebe dengesini gösteren bir tablodur. Bu matrisin satırları karar alıcı birimlerin gelirlerini, sütunları ise harcamalarını göstermektedir. Bu nedenle, her bir karar alıcı birim hem satırda ve hem de sütunda temsil edilmektedir. Matrisin oluşturulması için gerekli bilgilerin önemli bir bölümü ulusal hesaplardan ve resmi kayıtlarından elde edilirken, sektörel bilgilerin (üretim faktörlerine, devlete ve SGK'na yapılan ödemeler vb. gibi) ve sektörler arası ekonomik akımların (sektörlerin diğer sektörlerden ara girdi talepleri) elde edilmesi için resmi olarak açıklanan Girdi-Çıktı tablolarına ihtiyaç duyulmaktadır. Bu tablo-

nun Türkiye ekonomi için en güncel hali 2002 yılı için mevcuttur. Ekonomik yapıda gerçekleşen değişimlerin göz ardı edilmesinin yanı sıra sektörlerin toplam katma değer içerisinde paylarının, sektörler arası akımların ve sektörel katma değer içerisinde üretim faktörlerine yapılan ödemelerin paylarının sabit kaldığı varsayımlarıyla, 2002 tablosu önce anılan 11 sektör düzeyinde toplulaştırılmış ve daha sonra 2011 verileri kullanılarak güncellenmiştir.

Oluşturulan SHM kullanılarak sektörel düzeyde elde edilen bilgiler yardımıyla gerekli parametreler hesaplanmıştır. Bunlar sektörlerin üretim üzerinden ödedikleri vergi oranı (*prodtax*), mal ve hizmetler üzerinden alınan vergi oranları (*vatrev* ve *tariffs*), girişimler hesabı tarafından ödenen kurumlar vergisi oranı (*corptax*), brüt emek maliyeti üzerinden ödenen sektörel sosyal güvenlik katkı payları (*ssc*), vb. gibidir.

***Politika Analizleri***

HGD modellerinin temel özelliği, karşı olgusal (*counterfactual*) analizler yapılmasına olanak vermeleridir. Bir diğer deyişle bu modeller, "herhangi bir politika uygulandığı şekli ile değil de başka türlü uygulansaydı ne olurdu" sorusuna cevap verebilecek yapıdadırlar. Ancak bu, model ekonominin yaratılacak karşı olgusal duruma uygun olarak tasarlanmasını gerektirmektedir. Örneğin araştırma sorusu "küresel finans krizine ve borç krizine var olanın yarısı kadar kamu borcu ile girseydi Yunanistan ekonomisinde durum ne olurdu?" ise, ayrıntılı finansal ve kamu hesaplarının bulunduğu ve bunların hem birbirleri hem de ekonomideki diğer karar alıcı birimlerle ilişkilerinin ayrıntılı olarak içerildiği bir modele gereksinim duyulacaktır. Yukarıda ayrıntıları özetlenen model ekonomi, kamu politikalarının kişisel gelir dağılımı etkilerine odaklandığı için, hükümetin hem hanehalkları hem sektörler hem de dış dünya ile ilişkilerinin ayrıntılı olarak içeren bir yapıda tasarlanmıştır.

Kamu politikalarının etkilerinin analizi için iki farklı karşı olgusal analiz yapılmıştır. Bunlardan ilki, devletin hanelere yaptığı karşılıksız transferlerin GSYİH içerisindeki payının %20 oranında artırılmasıdır. İkinci olarak, sektörel sosyal güvenlik katkı oranlarında, her bir sektörün toplam kayıtlı vasıfsız (USF) istihdamı içerisindeki payı ile doğru orantılı olarak indirime gidilmesinin etkileri incelenmiştir.

Model, değişkenlerin birbirinden farklı üç patika izlediği çözümler sunmaktadır. Bunlardan ilki, "temel durağan durum" (kısaca TDD) olarak adlandırılan ve dört değişken hariç tüm

değişkenlerin SHM'de görülen değerlerinde sabit kaldıkları patikayı ifade etmektedir. Bu dört değişken, kamu tasarrufları, kamu dış borç stoku, kamu dış borç faiz ödemeleri ve dış tasarruflardır. SHM'de kamu tasarrufları negatif olduğu için, herhangi bir politika değişikliği olmasa dahi, her bir dönem dış bor stoku kamu tasarrufu kadar büyüyecek, bu dış borç faiz ödemelerini ve bunları finanse etmek için gerekli dış tasarruf talebini arttıracaktır. Bu patika boyunca, herhangi bir politika değişikliği olmadığı gibi, göç de sıfır kabul edilmiştir.

Modelin "temel patikası" (kısaca BP), herhangi bir politika değişikliğinin olmadığı ancak göçün, bir diğer deyişle beşeri değişimin ,var olduğu durumda ekonomik yapıdaki değişimin tasvir edildiği patikadır. Modelde emek arzı kararı içsel olduğu için, modelin kalibrasyonu göç yokmuş gibi yapılmış, göç modele bir şokmuş gibi empoze edilmiştir. Bunun dışında da yukarıda anılan iki politika şoku sonrası ekonominin izlediği patikayı tanımlamak için "deneyim patikası" (kısaca EXP) terimi kullanılacaktır. Bu iki patika, göçün varlığı altında politika parametrelerindeki değişimin ekonomik etkilerini göstermektedir. Transfer harcamalarının GSYİH içerisindeki payında artış EXP-1, sektörel sosyal güvenlik katkı oranlarında indirim EXP-2 olarak tanımlanacaktır. Modelin çözümünde GAMS (*General Algebraic Modeling System*) programının PATH çözücüsü (*solver*) kullanılmıştır.

Modelin temel patikası (BP), kırda yerleşik hanehalkarından göç edenlerin %30 (%70) olasılıkla kentte kayıtlı vasıfsız veya kayıtdışı olarak iş bulacakları varsayımı altında beşeri değişimin etkilerini incelemektedir. TÜİK verilerinden derlenen yıllık göç miktarları (2011 rakamı 63,991 iken 2007-2011 ortalaması 140,181'dir), modelde hesaplanan net reel ücret farkları ile uyumlu olacak şekilde 99,186 kişi olarak alınmıştır. Göçün başlaması ile birlikte kırda (kentte) emek arzı azalmakta (artmakta), kır-kent ücret farkı azalırken göç miktarı da tedricen düşmektedir; 100 dönemin sonunda yıllık göç miktarı 11,170 olarak gerçekleşmiştir.

Modelin temel patikası (BP) sunulurken anılan yüzde değişimler, ilgili değişkenin temel durağan durumdaki (TDD) değerine göredir. Emek türleri birbirlerinin eksik ikamesi olarak tasarlandığı için, bir emek grubunun ücretindeki düşüş o grubun emek talebini arttırırken, diğer emek gruplarında emek talebinin ve dolayısıyla ücretlerin düşmesine neden olmaktadır. RH grubu hariç düşen ücretler, emek maliyetlerini düşürürken emek taleplerinin artmasını ve katma değer ve sektörel üretimleri arttırmaktadır. Artan üretim, hem iç hem de dış pazarlara arz edilmektedir ancak iç pazara artan arz fiyatların düşmesine neden olmakta, bu da sabit

dünya fiyatlarından dış pazarlara satışı (döviz kuru uyumlanması olmadığı için) daha kârlı hale getirmektedir. Bu nedenle ihracat artmaktadır. İç piyasada düşen fiyatlar, yerli malları ithal ikameleri karşısında daha ucuz hale getirdiği için ithalat düşmektedir. Bu iki etki sonucunda net ihracat artar (%18,8). Artan üretim ve net ihracat artışının pozitif etkilerine karşın düşen fiyatlar nedeniyle GSYİH %1,6 oranında düşmüştür. Gelir vergisi ve sosyal güvenlik primi ödeyen kırda yerleşik hanehalklarının toplam emek arzının azalması ve diğer hane gruplarının düşen ücretleri nedenleriyle devletin gelir vergisi ve SGK'nın prim gelirleri azalmıştır. Düşen fiyatlar nedeniyle firma kârları azalmış, devletim kurumlar vergisi gelirleri de düşmüştür. Düşen ithalatın tarife gelirlerini de düşürmesi ile devletin toplam gelirleri %2,2 oranında azalmış, faiz dışı fazlada kötüleşmeye ve kamu tasarruflarında azalmaya neden olmuştur. Bu nedenle devletin dış borç stoku, 100 dönem sonunda %23 civarında artmıştır. Firma kârlılığındaki azalma yatırımlarına temettü maksimizasyonu ile karar veren, azalan GSYİH da diğer sektörlerin yatırım harcamalarında düşüşe yol açmış, toplam yatırımlar %1,75 oranında azalmış, aynı şekilde toplam temettüler de düşmüştür, %1,44. Emek piyasasında yaşanan gelişmelere bakıldığında, Ricardocu hanehalklarının (RH, CH ve SF) emek arzlarının azaldığı, buna karşılık işgücü piyasasına katılan Ricardocu olmayan hanehalklarının (USF ve IW) emek arzlarının arttığı görülmektedir ve etkiler RH (%-12,3) ve IW (%16,4) grupları için en yüksektir. Düşen ücretler nedeniyle her grubun, RH hariç, kişi başı emek gelirleri düşmüştür. Azalan temettü gelirlerinin yanı sıra düşen GSYİH nedeniyle hanelerin devletten ve SGK'dan aldıkları transfer gelirleri de azalmıştır. Sonuçta RH hariç tüm hane gruplarının kişi başı harcanabilir geliri azalmıştır ve etkiler USF ve IW grupları için en yüksektir. Bunun temel nedeni, göç nedeniyle bu iki grubun nüfusu arttığı için kişi başı transfer gelirlerindeki düşüş daha yüksektir. Göç RH grubunu tersine olumlu bir şekilde etkilemekte, azalan nüfus etkisi diğer gelir kalemlerindeki düşüşü telafi ederek kişi başı gelirde artışa sebep olmaktadır.

Göçün varlığı altında devletin toplam transfer bütçesini %20 oranında arttırması (EXP-1), durumunda tüm hanehalklarının devletten aldıkları transfer gelirleri artmakta, bu da kişi başı harcanabilir gelirlerini arttırmaktadır. Bu nedenle Ricardocu olmayan ve göç nedeniyle nüfusları etkilenen USF ve IW hane gruplarının kişi başı emek arzları azalmakta, bu da ücretlerini arttırmaktadır. Kır ile kent arasındaki ücret farklılığı arttığı için şokun verildiği ilk dönemde BP'ye göre %12 göç artışı gerçekleşmektedir. 100 dönemin sonunda göç hala BP'ye göre

%2 dolayında daha fazladır. Göçten etkilenen kentte yerleşik hanehalklarının ücretlerinin artışı, diğer hane gruplarında da aynı etkiyi yaratmakta, artan emek maliyetleri nedeniyle emek talebi ve dolayısıyla üretim azalmaktadır. İç piyasaya arz edilen miktarın düşmesi fiyatları arttırmakta, sabit dünya fiyatları nedeniyle ihracat azalırken, ithalatta artış görülmektedir. Dış ticaret açığı, BP'ye göre %5,9 oranında artmıştır. Azalan net ihracat ve düşen üretim nedenleriyle GSYİH %0.066 oranında artmıştır. Fiyat artışları çıktı düşüşlerini telafi ederek sektörel kârların ve toplam temettülerin artışına neden olmuştur. Artan göç, kırda vergi ve sosyal güvenlik primi ödeyen emekçilerin sayısında azalmaya ve aynı zamanda kentte kayıtdışı çalışarak bu yükümlülüklere sahip olmayan emekçilerin sayısında artışa neden olduğu için, prim ve emek geliri üzerinden alınan vergi gelirleri azalmıştır. Artan GSYİH, hem SGK'nın hem de devletin karşılıksız transferlerinde artışa neden olmuştur. Artan harcama ve düşen gelirler nedenleriyle SGK'nın bütçe açığı %1,2 düzeyinde artış göstermiştir. Düşen üretim nedeniyle üretimden alınan vergiler düşerken, artan iç ve dış ticaret nedeniyle dolaylı vergi gelirleri artmıştır. Artan sektörel kârlar kurumlar vergisini de olumlu yönde etkilemiş, sonuçta devletin gelirleri %0,09 oranında artmıştır. Hem SGK açıkları hem de hanelere transferler (politika değişkiliği ve artan GSYİH'nin toplam etkisiyle) arttığı için toplam hükümet harcamaları artmış, bozulan faiz dışı fazla nedeniyle kamu tasarrufları azalmış, hükümetin borcu 100 dönemin sonunda kartopu gibi büyüyerek BP değerinin 3,5 katına ulaşmıştır. Kârlarda görülen artış ve GSYİH artışı nedeniyle tüm sektörlerin yatırımlarında ve toplam yatırımlarda gerçekleşen artışın değeri %0,12 değerine ulaşmıştır. Transfer gelirlerindeki artış, harcanabilir gelirleri de arttırmakta, dolayısıyla emekçi kesimler emek arzlarını düşürmektedirler. Düşen emek arzları ücretleri arttırdığı için toplam emek gelirleri artmış, artan transferler ve temettü gelirleri ile birlikte hanelerin kişi başı harcanabilir gelirleri de yükselmiştir. En yüksek etki %13,6 ile sadece transfer gelirleri ile geçinen TRF grubunda görülmüştür.

Göçün varlığı altında devletin sektörel sosyal güvenlik katkı payı oranlarını sübvanse etmesi (EXP-2), birim emek maliyetini düşürerek her bir emek piyasası tabakasında talep artışlarını beraberinde getirmiştir ancak bu, RH ve IW gruplarında ücret artışlarına sebep olmamıştır. Bunun sebebi, emek piyasasında hem arz hem de talep tarafının içsel olarak çözülmesi ve gerek hanelerin gözünden sektörlerin gerekse sektörlerin gözünden hanelerin birbirlerinin eksik ikameleri olarak modellenmiş olmalarıdır. Ücretin RH grubunda düşmesi ancak USF ve IW gruplarında artması, kır ile kent arasındaki ücret farkında ilk dönemde yaklaşık %18'lik

bir artışa ve dolayısıyla göç miktarının BP'ye göre 1,8 kat artmasına neden olmuştur. Artan emek talepleri üretimi ve hem iç hem de dış pazarlara arzı arttırmış, iç piyasada gerçekleşen fiyat düşüşü ithalatı sınırlarken, sabit dünya fiyatlarında ihracat daha kârlı olduğu için ihracat arzı daha hızlı büyümüştür. Tüm bunların ışığında net ihracat BP'ye göre %42,3 düzeyinde, artan üretimle birlikte GSYİH de %2,2 oranında artmıştır. Artan emek talebi ve emek gelirleri (IW hariç) nedenleriyle SGK'nın hanelerden prim gelirleri artarken, düşen katkı payı oranları ve ücretler nedeniyle sektörlerden katkı gelirleri azalmıştır. Artan GSYİH nedeniyle hanelere karşılıksız transferlerin artışı ile birlikte bütçe açıkları orta vadede %4,7, 100 dönemin sonunda ise %2,95 düzeyinde artmıştır. Düşen üretim nedeniyle sektörel kârlar ve dolayısıyla hem kurumlar vergisi hem de temettüler artmıştır. Artan emek gelirleri nedeniyle doğrudan, artan üretim ve dâhilde ticaret nedenleriyle dolaylı vergi gelirleri artarken, azalan ithalat nedeniyle tarife gelirleri azalmıştır. Bunların sonucunda devletin toplam gelirleri kısa dönemde %4,4 düzeyinde, 100 dönemin sonunda ise %2,3 düzeyinde artarken, artan tüketim harcamaları, SGK açıkları ve hanelere transferlerdeki artış nedenleriyle harcamaları da artmıştır. Ancak gelirlerindeki artış oranı harcamalarının altında kaldığı için kamu tasarrufları artmış, azalan dış borç stoku nedeniyle dış ticaret faiz ödemeleri de düşmüş ve 100 dönemin sonunda toplam dış borç stoku BP değerinin dörtte birine gerilemiştir. Artan sektörel kârlar ve GSYİH yatırım harcamalarını (%1,7) ve toplam sermaye stokunu (%2,7) arttırmıştır. Artan emek talebi nedeniyle tüm hanehalkları da, her emek piyasası tabakasında dengeyi temi-nen, kişi başı emek arzlarını arttırmışlardır. Harcanabilir gelir artışlarına rağmen emek arzı artışı, bu parametre seti altında, ikame etkisinin gelir etkisinden büyük olduğunu ortaya koymaktadır. RH ve IW grubunda ücretler düşmesine rağmen sadece IW grubunun kişi başı emek gelirlerinde bir azalma görülmektedir. Transfer gelirlerinde görülen sınırlı artışın önemli bir bölümü artan göç nedeniyle USF ve IW (RH) gruplarını olumsuz (olumlu) etkilemiş, en yüksek kişi başı harcanabilir gelir artışı RH grubunda görülürken IW grubunda düşüş kaydedilmiştir.

Kişi başına düşen harcanabilir gelir açısından, gerek göç kaynaklı beşeri değişimin gerekse bu beşeri değişim veri iken uygulanan politikaların sadece kırda yaşayan hanehalkalarını, temel durağan duruma göre (TDD), daha iyi duruma getirdikleri görülmektedir. Beşeri değişim diğer hane gruplarının kişi başı gelirlerinde görece düşmeye sebep olurken, bu etki kayıtdışı çalışanlar grubunda en yüksektir. Bu kaçınılmaz değişimin devletin artan transfer har-

camaları ile birleştirilmesi (EXP-1) durumunda ise RH'ye ek olarak TRF grubunun da durumunun iyileştiği, diğer gruplardaki kötüleşmenin ise bir miktar telafi edildiği görülmektedir. Göçün varlığında emek maliyetlerinin sübvanse edilmesi (EXP-2) ise, yine TDD'ye göre, IW grubunun durumunu daha da kötüleştirmiş, CH ve SF gruplarının kötüleşmesini çok da değiştirmemiş, diğer gruplarda ise bir iyileşme sağlamıştır. Her bir hane grubunun toplam harcanabilir gelir içerisindeki payı dikkate alındığında Ricardocu hanehalklarının paylarının azaldığı (EXP-2'de SF hariç) görülmektedir. Ricardocu olmayan hanelerde ise USF ve IW gruplarının paylarının her üç durumda da (TDD'ye göre) arttığı, RET grubunun payının sabit kalıp, TRF grubunun payının da sadece EXP-1'de arttığı görülmektedir.

Bunların yanı sıra, bireysel gelir dağılımı analizi için yürütülen bir başka çalışma daha yürütülmüş, HGD modelinden elde edilen gelir türü bazında büyüme oranları ve hane grubuna özgü kompozit tüketim fiyatları kullanılarak üç patika için yeni kişi başı reel harcanabilir gelir değerleri hesaplanmıştır. HBA-2002 ve HBA-2011 kullanılarak kalibre edilmiş olan geçimlik tüketim sepetinin her üç patikadaki değeri de yoksulluk sınırı olarak kabul edilmiştir. Buradan, kişi başı harcanabilir reel gelirin Kernel tahmini (parametrik olmayan olasılık dağılım fonksiyonu) yapılmış ve toplam nüfus için gelir dağılımı ve yoksulluk sınırı değişimi incelenmiştir. Buna göre, BP ve EXP-1 boyunca, TDD'ye göre, gerek yoksulluk sınırında gerekse gelirin dağılımında kayda değer bir değişim görülmemektedir. Buna karşın EXP-2'de, hem gelir dağılımı eğrisi sağa doğru kaymakta, yani ortalama gelir artmakta, hem de yoksulluk sınırı (düşen fiyatların etkisiyle) sola doğru kaymakta, yani azalmaktadır. Bir diğer deyişle, yoksul nüfus azalmaktadır. Gelirin üretim faktörleri arasında dağılımı olarak tanımlanan fonksiyonel gelir dağılımına bakıldığında (net toplam emek gelirlerinin toplam temettülere oranı) ise her üç durumda da emek lehine bir değişim olduğu ancak BP ve EXP-1 boyunca değişimin çok sınırlı olduğu görülmektedir. Buna karşılık EXP-2'de, TDD'ye göre, emek gelirleri temettü oranı %5,6 oranında artmaktadır.

***Sonuç***

Bu tezin amacı, farklı kamu politikalarının bireysel gelir dağılımı üzerindeki etkilerinin analiz edilmesidir. Bu kapsamda, gerek hesaplanabilir genel denge (HGD) yöntemini kullanan ilgili yazına gerekse Türkiye ekonomisi için yapılmış çalışmalara çeşitli katkılar sunan bir model ekonomi tasarlanmıştır. Bunun yanında, mevcut hane ve firma / sektör düzeyindeki veri

setlerinden yararlanılarak kalibrasyon süreci tamamlanan model, devletin karşılıksız transfer bütçesinin arttırılması ve sektörlerin emek maliyetlerinin düşürülmesi şeklinde iki farklı karşı olgusal senaryonun etkilerini analiz etmek için kullanılmıştır.

Kamu politikalarının etkinliği, hem gelir dağılımı göstergelerindeki değişim hem de bireylerin emek piyasasına katılımları ve çalışma saatleri üzerindeki etkileri ile değerlendirilebilir. Beşeri değişim, Ricardocu (olmayan) hanehalklarının daha az (fazla) çalışmalarına neden olurken, gelir dağılımının Ricardocu olmayanlar lehine sınırlı bir şekilde iyileşmesini de beraberinde getirmektedir. Beşeri değişime kamunun artan transfer harcamaların eşlik etmesi durumunda tüm hanehalklarının daha az çalıştığı ancak gelir dağılımında Ricardocu olmayan hane grupları lehine iyileşmenin daha yüksek olduğu görülmektedir. Buna karşılık, beşeri değişimin varlığı altında emek maliyetinin düşürülmesi ise tüm hanehalkı gruplarının daha fazla çalışmasına ve Ricardocu olmayan hanehalkları lehine gelir değişiminin en yüksek olmasına neden olmaktadır. Ancak her üç durumda da kayıtdışılık (IW grubu istihdamının toplam istihdam içindeki payı) artmakta ve bu EXP-2'de en yüksek değere ulaşmaktadır. Bunun iki temel sebebi; hem göç edenlerin önemli bir bölümünün kayıtışı olacağının varsayılması hem de emek tiplerine göre sosyal güvenlik katkı paylarında (ilgili veri bulunmamaktadır) değil, kompozit katkı payında indirime gidilmesidir.

Bu sonuçlar, mevcut karşılıksız yardım politikasının bütçesi arttırılmasına rağmen yoksullukla mücadelede yeterli olmadığını göstermektedir. Düşen GSYİH ile emekçi ve görece az gelirli kesimlerin daha az çalışmaları, politikanın olumsuz yanlarıdır. Bununla birlikte, sermayeyi ve vasıfları gereği yöneticilik pozisyonlarını elinde bulunduran CH ve SF gruplarının, kendi göreli durumlarını kötüleştirecek bir politika değişikliğine onay verip vermeyecekleri gibi meselenin politik-ekonomi boyutu öne çıkmaktadır.

Modelin ayrıntıları, burada sonuçları tartışılan iki politika önermesinin hem daha farklı şekillerde tasarlanmalarına hem de başka politika önerilerinin analiz edilmesine imkân vermektedir. EXP-1'e ek olarak, yalnızca toplam bütçe artışının değil, transferlerin hane grupları arasındaki dağılımının değiştirilmesi durumu da değerlendirilebilir. Bununla birlikte, politikanın kendisinin değiştirilerek transfer miktarının şartlı bir yapıda olmasının, örneğin kişi başı emek arzının belirli bir eşik değeri aşmasına veya doğrudan emek arzı ile doğru orantılı olmasına vb. gibi, etkileri irdelenebilir. EXP-2'de ise kamunun teşvik politikalarının

diğer araçları gibi sektörel teşviklerin üretim maliyetlerinin düşürülmesi veya yatırımların teşvik edilmesi için verildiği durumlar incelenebilir. İlk durumda üretimden alınan vergilerin azaltılması, ikinci durumda ise kurumlar vergisi oranının sübvanse edilmesi yoluna gidilebilir ve tüm bu araçlar tüm sektörler için değil seçili bazı sektörler için uygulanabilir.

Tüm bunlara ek olarak HGD modelinin sonuçlarının, HBA'nın etkin olarak kullanıldığı bir mikro-benzetim yoluyla yoksulluk ve gelir dağılımı analizlerinde kullanılması, elde edilen sonuçları değiştirebilecektir. Ancak bahsedildiği gibi, yöntem olarak bu tezin kapsamı dışında olduğu için yapılmamış olan bu analiz ve yukarıda anılan diğer politika tasarımları, gelecek araştırma gündeminin parçalarını oluşturmaktadır.

# APPENDIX I

## TEZ FOTOKOPİSİ İZİN FORMU

**ENSTİTÜ**

Fen Bilimleri Enstitüsü ☐

Sosyal Bilimler Enstitüsü ☐

Uygulamalı Matematik Enstitüsü ☐

Enformatik Enstitüsü ☐

Deniz Bilimleri Enstitüsü ☐

**YAZARIN**

Soyadı :
Adı :
Bölümü :

**TEZİN ADI** (İngilizce) :

**TEZİN TÜRÜ** : Yüksek Lisans ☐ Doktora ☐

1. Tezimin tamamından kaynak gösterilmek şartıyla fotokopi alınabilir. ☐
2. Tezimin içindekiler sayfası, özet, indeks sayfalarından ve/veya bir bölümünden kaynak gösterilmek şartıyla fotokopi alınabilir. ☐
3. Tezimden bir bir (1) yıl süreyle fotokopi alınamaz. ☐

**TEZİN KÜTÜPHANEYE TESLİM TARİHİ**: